SKRIPSI – ME 141501

STUDI PERANCANGAN LENGAN CADIK PADA JUKUNG BERBAHAN HDPE DENGAN SOLIDWORK

SALMAN FARIZY
NRP 4214 105 008

Dosen Pembimbing
Ir. Agoes Santoso, MSc., MPhil., CEng.

JURUSAN TEKNIK SISTEM PERKAPALAN
FAKULTAS TEKNOLOGI KELAUTAN
INSTITUT TEKNOLOGI SEPULUH NOPEMBER
SURABAYA
2018

“halaman ini sengaja dikosongkan”

SKRIPSI – ME 141501

STUDY OF THE DESIGN OF THE ARM-BASED OUTRIGGER JUKUNG ON HDPE WITH SOLIDWORK

SALMAN FARIZY
NRP 4214 105 008

Dosen Pembimbing
Ir. Agoes Santoso, MSc., MPhil., CEng.

JURUSAN TEKNIK SISTEM PERKAPALAN
FAKULTAS TEKNOLOGI KELAUTAN
INSTITUT TEKNOLOGI SEPULUH NOPEMBER
SURABAYA
2018

"halaman ini sengaja dikosongkan"

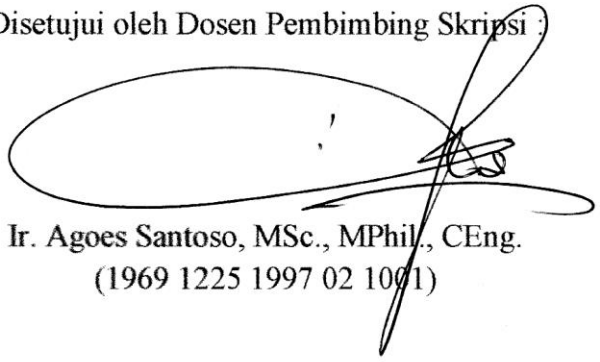
STUDI PERANCANGAN LENGAN CADIK PADA JUKUNG BERBAHAN HDPE DENGAN SOLIDWORK

TUGAS AKHIR

Diajukan Untuk memenuhi Salah Satu Syarat
Memperoleh Gelar Sarjana Teknik
pada
Bidang Studi Marine Machinery System (MMS)
Program Studi S-1 Jurusan Teknik Sistem Perkapalan
Fakultas Teknologi Kelautan
Institut Teknologi Sepuluh Nopember

Oleh:
SALMAN FARIZY
NRP. 4214105008

Disetujui oleh Dosen Pembimbing Skripsi :



Ir. Agoes Santoso, MSc., MPhil., CEng.
(1969 1225 1997 02 1001)

SURABAYA
JULI 2018

“halaman ini sengaja dikosongkan”

STUDI PERANCANGAN LENGAN CADIK PADA JUKUNG BERBAHAN HDPE DENGAN SOLIDWORK

TUGAS AKHIR

Diajukan Untuk memenuhi Salah Satu Syarat
Memperoleh Gelar Sarjana Teknik
pada
Bidang Studi Marine Machinery System (MMS)
Program Studi S-1 Jurusan Teknik Sistem Perkapalan
Fakultas Teknologi Kelautan
Institut Teknologi Sepuluh Nopember

Oleh:
SALMAN FARIZY
NRP. 4214105008

Disetujui oleh Dosen Pembimbing Skripsi :

Dr. Eng. M. Badruz Zaman., ST., M.T.
(197108022008 01 100)

SURABAYA
JULI 2018

“halaman ini sengaja dikosongkan”

STUDI PERANCANGAN LENGAN CADIK PADA JUKUNG BERBAHAN HDPE DENGAN SOLIDWORK

Nama Mahasiswa : Salman Farizy
NRP : 4211445000008
Jurusan : Teknik Sistem Perkapalan FTK-ITS
Dosen Pembimbing : Ir. Agoes Santoso, MSc., MPhil., CEng.

Abstrak

HDPE atau High Density Polythylene adalah pipa terbaik dari pada pipa lainnya. Pipa hdpe memiliki sifat yang elastis atau lentur. Sehingga mudah dalam pemasangan, mudah dalam penyambungan, dapat mengikuti pergerakan tanah, dan juga mudah dalam expedisi. Selain itu pipa hdpe adalah pipa yang terbuat dari bahan Polythylene (PE). Sehingga banyak orang menyebutnya dengan pipa pe yang dimana materialnya memiliki keretakan yang rendah sehingga dapat bertahan lebih dari 50 tahun.

Dalam penelitian ini dilakukan proses simulasi terhadap lengan cadik pada jukung dengan panjang 5,8 m berbahan HDPE, lalu dipelajari ketebalan lengan cadik yang bagus kualitasnya, aman untuk digunakan, dan tidak membahayakan untuk jukung. Tebal lengan cadik pada skripsi ini divariasi 80 mm, 100 mm, dan 120 mm dengan sudut rolling 1°-6°. Profil yang digunakan untuk lengan cadik juga divariasi antara I bar dan T bar.

Dari hasil simulasi dapat dilihat bahwa profil I bar dengan ketebalan 80 mm tidak dapat digunakan karena menerima beban diatas melebihi batas yield stress bahan HDPE sehingga material tidak akan kembali ke bentuk semula satt menerma pembebanan. Sedangkan untuk material I bar dengan tebal 100 mdan 120 mm dapat digunakan. Dan material T bar dapat digunakan semua karena dilihat dari nilai safety factor dari T bar memenuhi untuk digunakan pada jukung.

Kata Kunci : Jukung, Lengan cadik, HDPE, Profil Lengan Cadik.

"halaman ini sengaja dikosongkan"

STUDY OF THE DESIGN OF THE ARM-BASED OUTRIGGER JUKUNG ON HDPE WITH SOLIDWORK

Name : **Salman Farizy**
NRP : **4211445000008**
Majors : **Teknik Sistem Perkapalan FTK-ITS**
Lecture : **Ir. Agoes Santoso, MSc., MPhil., CEng.**

Abstract

HDPE or High Density Polythylene is best from the pipe on the other pipes. Hdpe pipes have elastic properties or pliable. So easy in installation, easy connection, can follow the movement of the ground, and also easily in expedisi. Besides pipe hdpe pipe is made from Polythylene (PE). So many people call it with pipes pe where their material has a low rift so it can last more than 50 years.

In this study performed a simulation process against arm Outrigger jukung at 5.8 m long, made from HDPE, then learned a great Outrigger arm thickness quality, safe to use, and do no harm to jukung. Thick arms Outrigger on this thesis divariasi 80 mm, 100 mm, and 120 mm with angle rolling 1 °-6 °. Profile used for the arms of Outrigger also in the variation between the I bar and T bar.

From the results of simulations can be viewed that profile I bar with the thickness of 80 mm cannot be used because the receive load above exceeded the yield stress of the material HDPE material so that it will not return to its original shape satt receiving imposition. As for the material I bar with thick 120 mm mdan 100 can be used. T bar and material can be used in all since seen from the value of the safety factor of the T bar cater for use at jukung.

Key Word : Jukung, An Outrigger Arm, HDPE, Profil An Outrigger Arm

“halaman ini sengaja dikosongkan”

KATA PENGANTAR

Segala puji bagi Allah SWT yang telah melimpahkan rahmat dan hidayah-Nya, semoga penulis selalu dalam limpahan iman dan keindahan bertawakkal kepada-Nya. Shalawat dan salam semoga senantiasa tercurah kepada Rasulullah Muhammad SAW, keluarga, sahabat, dan para pengikutnya yang tetap istiqamah hingga akhir zaman. Alhamdulillah "STUDI PERANCANGAN LENGAN CADIK PADA JUKUNG BERBAHAN HDPE DENGAN SOLIDWORK" ini dapat diselesaikan. Penulisan skripsi ini sebagai salah satu persyaratan dalam memperoleh gelar sarjana di ITS Surabaya.

Skripsi ini menganalisa tentang lengan cadik pada jukung berbahan HDPE. Dengan menganalisa berapa besar tegangan yang diterima lengan cadik jika sudut rolling jukung divariasi. Sehingga dapat ditentukan lengan cadik yang bagus, aman untuk digunakan, dan tidak membahayakan bagi pengguna jukung.

Banyak pihak yang telah membantu penulis hingga terselesaikan penulisan laporan tugas akhir ini dengan tepat waktu. Pada kesempatan ini penulis ingin mengucapkan terima kasih yang sebesar-besarnya kepada :

1. Allah SWT yang telah memberikan Hidayahnya kepada umatnya ini untuk mnyelesaikan tugas akhir ini.
2. Kedua orang tua penulis (ibu Siti Maryam dan bapak Kun Pratomo), dan kedua kakak saya (Muhammad Khoirullah dan Azizah) dan segenap keluarga yang selalu memberikan dukungan dan doa yang tidak ada hentinya.
3. Kedua orang tua angkat saya (Habib Hamid bin Ali Assegaf dan Habib Idrus bin Muhammad Al Aydrus) yang selalu memberikan pencerahan batin, suntikan semangat, serta nasehat.
4. Bapak Ir. Agoes Santoso, MSc., MPhil., CEng selaku dosen pembimbing yang telah memberikan arahan, masukan, bimbingan, dan nasehat, selama proses penyusunan skripsi ini.
5. Ahmad Habibi a.k.a wali, Reza Fauzi a.k.a ndorobei, Majid a.k.a an naumi, Jazilul Fawaid a.k.a ustadz dan teman-teman seperjuangan yang telah membully saya selama proses skripsi ini berlangsung.

Akhir kata penulis menyadari bahwa dalam penulisan skripsi ini masih jauh dari kesempurnaan. Karena itu, penulis memohon saran dan kritik yang sifatnya membangun demi kesempurnaannya dan semoga bermanfaat bagi kita semua. Amiin

"halaman ini sengaja dikosongkan"

DAFTAR ISI

DAFTAR GAMBAR

DAFTAR TABEL

"halaman ini sengaja dikosongkan"

BAB I
PENDAHULUAN

1.1 Latar Belakang

Jukung adalah sebutan untuk perahu tradisional suku banjar di Kalimantan Selatan. Jukung dibagi menjadi 3 kelompok besar yaitu, jukung sudur, jukung patai, dan perahu betambit. Jukung berfungsi sebagai alat perhubungan dan perdagangan serta pelengkapan menangkap ikan di sungai, danau maupun di rawa-rawa. Jukung merupakan sarana transportasi laut yang umum digunakan oleh nelayan di Indonesia. Hanya saja, Jukung tradisional terbuat dari bahan kayu yang mudah lapuk. Penebangan hutan untuk membuat Jukung tradisional sangatlah tidak ramah lingkungan, terutama setelah melihat kondisi hutan Indonesia yang sangat parah.

Beberapa inovasi sudah dilakukan untuk mendapatkan parahu jukung yang handal dan tahan lama, salah satunya berupa Jukung yang terbuat dari Prime Grade High Density Polyethylene (HDPE). Oleh karena terbuat dari bahan Polyethylene, maka tidak perlu lagi menebang pohon untuk membuat Jukung. Bahan HDPE memiliki umur pakai dan ketahanan terhadap benturan yang jauh lebih tinggi dari pada bahan kayu maupun fiber. Terdiri dari sebuah alat apung utama yang dilengkapi dengan dua buah alat apung penyeimbang, Jukung ini tidak dapat tenggelam dalam cuaca seganas apapun, sekalipun badan jukung terisi dengan air. Jukung terbuat dari pipa yang ujungnya dipipihkan, sehingga dapat membelah air dengan sangat baik. Oleh karena pipa berisi udara dan disegel, daya apung Jukung dan di dalam pipa, sehingga tidak dapat tenggelam dalam cuaca buruk bahkan ketika terbalik sekalipun. Selain itu, Jukung memiliki umur pakai hingga 20 tahun; jauh lebih lama dari Jukung.

Jukung merupakan perahu berlambung tunggal yang ringkas dan dapat diandalkan, cocok digunakan untuk memancing, menangkap ikan, dan berlayar jarak jauh. Jukat (Jukung Katamaran) merupakan katamaran yang diberi cadik seperti jukung, sehingga menghasilkan stabilitas yang lebih daripada katamaran. Cadik sendiri harus kuat dan ringan dengan panjang 1,5 m untuk perahu nelayan. Dimana cadik juga berfungsi untuk menstabilkan jukung. Berdasarkan uraian

diatas, perlu dilakukan penelitian tentang kekuatan cadik pada kapal Jukung.

Studi Perancangan Lengan Cadik pada Jukung Berbahan HDPE dengan Solidwork dilakukan dengan menghitung buoyancy pada lambung yang nantinya akan menghasilkan daya angkat sehingga dapat dihitung kekuatan minimal cadik. Pada tugas akhir ini, akan dilakukan simulasi dengan memanfaatkan software Solidwork.

1.2 Perumusan Masalah

Dari uraian diatas, permasalahan yang akan dibahas dalam penulisan skripsi ini adalah :

a. Berapa minimal dimensi cadik yang diperlukan jukung ?
b. Berapa kekuatan maksimal yang dapat diterima oleh lengan cadik ?
c. Bagaimana bentuk detail konstruksi cadik yang cocok untuk jukung ?

1.3 Tujuan Skripsi

Tujuan dari penulisan skripsi ini adalah :

a. Mengetahui minimal dimensi cadik yang diperlukan jukung.
b. Mengetahui kekuatan maksimal yang dapat diterima oleh lengan cadik.
c. Mengetahui bentuk detail konstruksi cadik yang cocok untuk jukung.

1.4 Manfaat

Adapun Manfaat dari penulisan skripsi ini adalah sebagai berikut :

a. Memberi informasi mengenai minimal dimensi cadik yang diperlukan jukung.
b. Memberi informasi mengenai kekuatan maksimal yang dapat diterima oleh lengan cadik.
c. Memberi informasi mengenai bentuk detail konstruksi cadik yang cocok untuk jukung.

1.5 Batasan Masalah

Batasan masalah dalam mengerjakan skripsi ini adalah :

a. Jukung berukuran panjang 5,8 m.
b. Software yang digunakan adalah solidwork.
c. Tidak menghitung *life time* dari material yang digunakan.

“halaman ini sengaja dikosongkan”

BAB II
TINJAUAN PUSTAKA

2.1 Kapal Penangkap Ikan

Kapal penangkap ikan adalah kapal atau perahu yang digunakan untuk menangkap ikan baik di sungai, danau, ataupun laut. Beragam jenis kapal laut digunakan pada penangkapan ikan rekreasi, olahraga, ataupun komersial. Berikut ini jenis-jenis kapal penangkap ikan modern :

1. Kapal Purse Seine

   Untuk Jenis Kapal Penangkap Ikan Dengan alat tangkap Purse seine yang Paling bisa di amati adalah Adanya alat bantu Power Block pada Kapal Modern. Sedangkan Pada kapal Traradisional dengan bahan Material Kayu yang dan bisa kita lihat adalah adanya alat bantu gardan. Jenis kapal purse seine tentunya menggunakan alat tangkap purse seine. Dan pada saat ini jenis kapal ini banyak terdapat di pelabuhan pelabuhan di Pantai Utara jawa. Fungsi dari alat bantu power block dan Gardan Berbera. Untuk Power Block Berfungsi Menarik Jaring Purse seine dan posisi nya berada di belakang atau buritan kapal. Untuk Fungsi Gardan adalah menarik Tali Ris Bawah pada alat tangkap Purse seine. Jenis Kapal Penangkap Ikan Purse seine biasa paling banyak di wilayah laut jawa dan beroperasi di samudera hindia di bagian barat pulau sumetera dan di bagian laut maselmbu.

Gambar 2. 1 Kapal Purse Seine

2. Kapal Pole and Line

Kapal Pole and Line adalah kapal yang menggunakan alat tangkap pole and line atau huhate. Jenis kapal penangkap ini cenderung lebar di lambung kapal. Karena di lambung kapal di gunakan untuk abk duduk memancing. Dan untuk Jenis Kapal Pole and line selain lambung yang melebar serta cenderung bertipe V karena kapal ini membutuhkan kecepatan dalam hal untuk mengejar gerombolan ikan perenang cepat. Jenis Kapal perikanan ini di banyak terdapat di indonesia timur dan menangkap ikan semisal cakalang, tongkol dan baby tuna,. Kapal Ini di beri alat bantu penangkapan berupa air mancur,. Fungsi dari air mancur agar ikan ikan mendekat ke kapal.

Gambar 2. 2 Kapal Pole and Line

3. Kapal Long Line

Seperti namanya kapal ini di buat dengan fungsi untuk menangkap ikan dengan alat tangkap long line. Besarnya kapal longline berkisar dari 30 GT- ratusan GT. Kapal ini di desain untuk lautan besar dan menangkap ikan jenis tuna. Kapal Jenis long line biasanya di beri alat bantu penangkapan ikan berupa Branch maki, Line hauler dan line arranger. Dan jenis Kapal penangkap Ikan long line ini biasanya membutuhkan keseimbangan kapal dari pada kecepatan ataupun tenaga kapal. Jenis kapal penangkap ikan long line biasanya berlayar menyusuri samudera dan lautan luas karena itu ombak dan angin adalah permasalahan tersendiri dalam mengoperasikan alat tangkap Long Line.

Gambar 2. 3 Kapal Long Line

4. Kapal Trawl

Jenis kapal dengan menggunakan alat tangkap trawl saat ini telah di larang pengoperasiannya. Selain menyebabkan kerusakan habitat. kapal trawl sering beroperasi di pinggir pantai. Jenis Kapal Penangkap Trawl biasanya di peruntukkan untuk menangkap udang. Kapal trawl membutuhkan tenaga kapal yang sangat besar. Karena tenaga tersebut di gunakan untuk menarik atau meng hela jaring trawl istilah dalam penangkan ikan adalah Towing. Saat ini keberadaan Kapal Penangkap trawl sudah berurang jumlahnya. Selain Hasil tangkapan yang berkurang juga karena pelarangan pengggunaan alat tangkap Trawl. Kapal Trawl Biasanya menangkap udang dan hasil sampingannya adalah ikan. Keberadaan Kapal trawl pada tahun 1990 - 2000 mengalami kejayaan di indonesia timur.

Gambar 2. 4 Kapal Trawl

Dan terdapat berbagai jenis penangkapan ikan dengan menggunakan kapal tradisional. Berikut ini jenis-jenis kapal kapal penangkap ikan tradisional :

1. Perahu Kano

   Perahu Kano merupakan perahu tradisional yang dibuat dengan cara tradisional dan dioperasikan dengan menggunakan layar dan dayung, tanpa menggunakan mesin. Sejumlah perahu tradisional seperti kano ini masih dipakai di beragam negara berkembang dengan garis pantai perikanan produktif yang cukup panjang.

Gambar 2. 5 Perahu Kano

2. Perahu Jukung

   Merupakan perahu dengan bentuk lambung yang sempit dan dilengkapi sayap. Dalam bahasa Filipina perahu jenis jukung ini mendapat sebutan Banca. Sama seperti kano, jukung pun masih banyak dipakai di beragam negara berkembang salah satunya Indonesia.

Gambar 2. 6 Perahu Jukung

3. Perahu Pemasang Jebakan

   Merupakan kapal yang dipakai dalam pemasangan jebakan untuk penangkapan hewan di laut.

Gambar 2. 7 Perahu Pemasang Jebakan

2.2 Jukung

Jukung adalah sebutan untuk perahu tradisoonal suku Banjar di Kalimantan Selatan Jukung dibagi menjadi 3 kelompok besar yaitu jukung sudur, jukung patai, dan jukung betambit. Jukung berfungisi sebagai alat perhubungan dan perdagangan serta perlengkapan menangkap ikan di sungai, danau maupun rawa-rawa. Jukung ini memiliki daya angkut 10-20 ton. Pada dasarnya, perahu khas suku banjar ini termasuk ramah lingkungan karena selian terbuat dari kayu juga tidak menggunakan bahan bakar minyak. Namun, hingga saat ini, sebagian dari bentuk atau jenis jukung ini telah mengalami perubahan menjadi kelotok atau perahu motor seiring perkembangan teknologi yang semakin modern.

2.3 Inovasi Jenis Jukung

Jukung merupakan sarana transportasi laut yang umum digunakan oleh nelayan di Indonesia. Hanya saja, Jukung tradisional terbuat dari bahan kayu yang mudah lapuk. Penebangan hutan untuk membuat Jukung tradisional sangatlah tidak ramah lingkungan, terutama setelah melihat kondisi hutan Indonesia yang sangat parah. AquaTec menciptakan sarana transportasi laut modern berupa Jukung Anti Tenggelam yang terbuat dari bahan Polyethylene. Oleh karena terbuat dari bahan Polyethylene, maka tidak perlu lagi menebang pohon untuk membuat Jukung. Jukung Anti Tenggelam AquaTec terbuat dari pipa yang ujungnya dipipihkan, sehingga dapat membelah air

dengan sangat baik. Oleh karena pipa berisi udara dan disegel, daya apung Jukung Anti Tenggelam AquaTec berada di dalam pipa, sehingga tidak dapat tenggelam dalam cuaca buruk bahkan ketika terbalik sekalipun. Selain itu, Jukung Anti Tenggelam AquaTec memiliki umur pakai hingga 20 tahun; jauh lebih lama dari Jukung tradisional pada umumnya.

Jukung Anti Tenggelam AquaTec merupakan perahu berlambung tunggal yang ringkas dan dapat diandalkan, cocok digunakan untuk memancing, menangkap ikan, dan berlayar jarak jauh. Berbeda dengan sarana transportasi dari bahan fiber, Jukung Anti Tenggelam AquaTec memiliki ketahanan terhadap benturan yang sangat tinggi. Jikalau sarana transportasi fiber mudah pecah ketika terkena benturan, Jukung Anti Tenggelam AquaTec tahan terhadap benturan yang sangat keras. Dengan menggunakan pipa Polyethylene yang bersifat lentur dengan ketebalan hingga 12,5 mm untuk keamanan. Dengan menggunakan Jukung Anti Tenggelam AquaTec, nelayan dapat melaut dengan lebih jauh dan aman untuk tingkat kehidupan yang lebih baik.

Gambar 2. 8 Jukung Anti Tenggelam

2.4 High Density Polythylene (HDPE)

HDPE atau High Density Polythylene adalah pipa terbaik dari pada pipa lainnya. Pipa hdpe memiliki sifat yang elastis atau lentur. Sehingga mudah dalam pemasangan, mudah dalam penyambungan, dapat mengikuti pergerakan tanah, dan juga mudah dalam expedisi. Selain itu pipa hdpe adalah pipa yang terbuat dari bahan Polythylene (PE). Sehingga banyak orang menyebutnya dengan pipa pe yang dimana materialnya memiliki keretakan yang rendah sehingga dapat bertahan lebih dari 50 tahun.

2.5 Tegangan

Setiap gaya yang bekerja pada suatu material, selalu menimbulkan reaksi berupa gaya dalam dari struktur material (yang besarnya sama tapi berlawanan arah). Bekerjanya gaya ini pada penampang permukaan benda mengakibatkan terjadinya tegangan di dalam struktur material benda, karena gaya akan terbagi rata di setiap satuan luas bidang penampangnya. Besarnya gaya yang terjadi akibat pembebanan, disebut sebagai tegangan /stress (σ).

Tegangan/stress didefinisikan sebagai besarnya gaya yang diberikan setiap satu satuan luas penampang material. Tegangan maksimum akibat gaya atau beban maksimum yang mengenai benda, sangat menentukan sekali bagi keberhasilan material benda untuk bertahan dari kerusakan. Karena akan menjadi batasan maksimum bagi kekuatan struktur material benda untuk bertahan dari pembebanan lebih (diluar kondisi normal).

Oleh karena itu untuk menghindari kegagalan material dalam menghadapi pembebanan, besarnya tegangan yang terjadi tidak boleh melebihi kekuatan struktur material. Sehingga pemilihan besar kekuatan bahan material, ditentukan sekali oleh besarnya tegangan akibat beban maksimum. Dalam perhitungan, besar kekuatan material dinyatakan sebagai tegangan izin bahan atau kekuatan bahan (σ ijin).

2.6 Gaya

Gaya merupakan dorongan atau tarikan yang akan mempercepat atau memperlambat gerak suatu benda, artinya gaya penyebab suatu benda bergerak. Di alam ini banyak sekali jenis gaya yang dapat bekerja pada benda di kehidupan sehari-hari. Konsep gaya secara umum terdapat tiga jenis gaya yang perlu kalian ketahui adalah berat, gaya normal, dan gaya gesek. Selain itu, materi gaya sangat erat kaitannya dengan usaha, gerak, kinematika, mekanika dan lain-lain yang akan kalian pelajari di SMA dan SMP. Simak penjelasan berikut mengenai macam-macam gaya.

2.6.1 Gaya Berat

Pada kehidupan sehari-hari, banyak orang yang salah mengartikan antara massa (m) dengan berat (w). Misalnya, orang mengatakan “Doni memiliki berat badan 65 kg”. Pernyataan orang tersebut keliru

karena sebenarnya yang dikatakan orang tersebut adalah massa Doni. Anda harus dapat membedakan antara massa dan berat. Massa merupakan ukuran banyaknya materi yang dikandung oleh suatu benda. Massa (m) suatu benda besarnya selalu tetap dimanapun benda tersebut berada, satuannya kg. Berat (w) merupakan gaya gravitasi bumi yang bekerja pada suatu benda. Satuan berat adalah Newton (N).

Gaya berat (w) yang dialami benda besarnya sama dengan perkalian antara massa (m) benda tersebut dengan percepatan gravitasi (g) di tempat itu. Secara matematis dapat ditulis sebagai berikut.

$$W = m.g$$

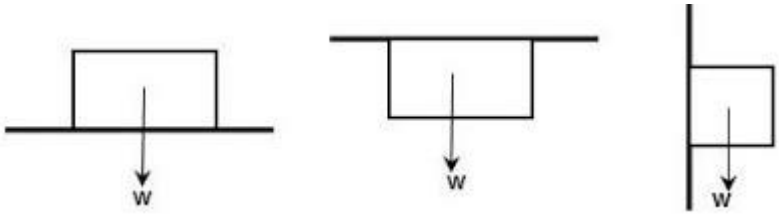
Dimana:

W = Gaya Berat (N)

m = massa benda (kg)

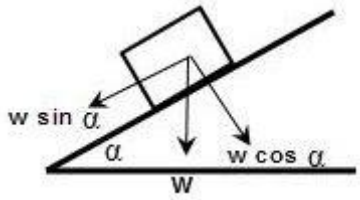
g = persecapatn gravitasi (m/s^2)

Penggambaran arah dari gaya berat (w) selalu menuju kebawah (pusat bumi). Misalkan sebuah benda berada pada bidang datar, perhatikan gambar dibawah ini.



Gambar 2. 9 Arah Gaya berat pada bidang datar

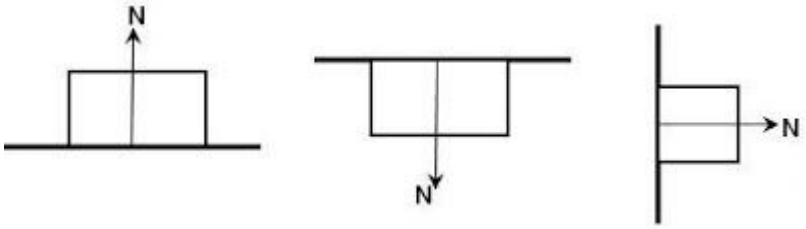
Bagaimana jika benda tersebut tidak berada pada bidang datar (miring), membentuk sudut terhadap sumbu x, sehingga jika kita proyeksikan terhadap bidangnya secara tegak lurus, akan kita peroleh besar dan arah gaya beratnya adalah sebagai berikut :



Gambar 2. 10 Arah gaya berat pada bidang miring

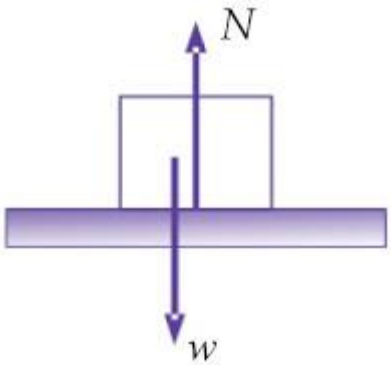
2.6.2 Gaya Normal

Kita ketahui bahwa benda yang dilepaskan pada ketinggian tertentu akan jatuh bebas. Gaya yang menahan buku agar tidak jatuh adalah gaya tekan meja pada buku. Gaya ini ada karena permukaan buku bersentuhan dengan permukaan meja dan sering disebut gaya normal. Gaya normal (N) adalah gaya yang bekerja pada bidang yang bersentuhan antara dua permukaan benda, yang arahnya selalu tegak lurus dengan bidang sentuh.



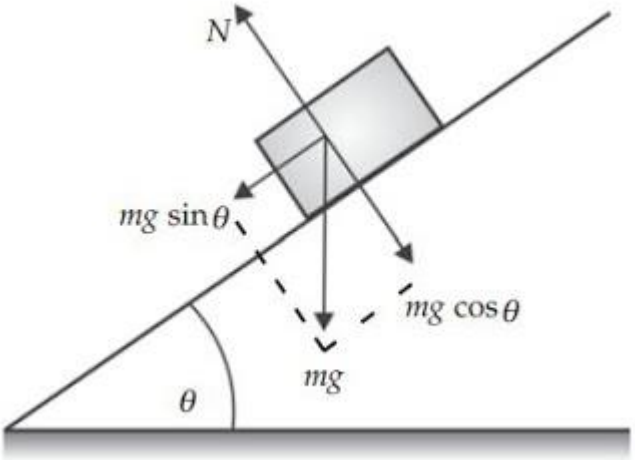
Gambar 2. 11 Arah gaya normal pada bidang datar

Besarnya gaya normal (N) dapat kita tentukan dengan menggunakan konsep hukum newton III. Sehingga besarnya gaya normal di bidang datar sumbu x adalah sama dengan gaya berat benda, N = W = mg. Perhatikan gambar dibawah :



Gambar 2. 12 Arah gaya normal terhadap berat

Jika benda tersebut tidak berada pada bidang datar (miring), membentuk sudut terhadap sumbu x, perhatikan gambar berikut :



Gambar 2. 13 Arah gaya normal pada bidang miring

2.6.3 Gaya Gesek

Gaya gesek adalah gaya yang berarah melawan gerak benda atau arah kecenderungan benda bergerak. Gaya gesek muncul apabila dua buah benda bersentuhan. Benda-benda yang dimaksud di sini tidak harus berbentuk padat, melainkan dapat pula berbentuk cair, ataupun gas. Gaya gesek antara dua buah benda padat misalnya adalah gaya gesek statis dan kinetis, sedangkan gaya antara benda padat dan cairan serta gas adalah gaya Stokes.

Gaya gesek dapat merugikan atau bermanfaat. Akan tetapi tanpa gaya gesek manusia tidak dapat berpindah tempat karena gerakan kakinya hanya akan menggelincir di atas lantai. Tanpa adanya gaya gesek antara ban mobil dengan jalan, mobil hanya akan slip dan tidak membuat mobil dapat bergerak. Tanpa adanya gaya gesek juga tidak dapat tercipta parasut.

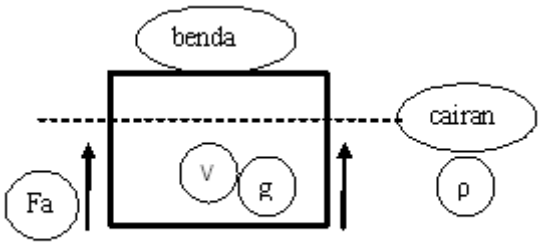
2.7 Gaya Apung

Gaya apung, atau Buoyancy, adalah gaya ke atas yang dikerjakan oleh fluida yang melawan berat dari benda yang direndam. Pada sebuah kolom fluida, tekanan meningkat seiring dengan bertambahnya kedalaman sebagai hasil dari akumulasi berat air di

atasnya. Sehingga benda yang tenggelam ke dalam fluida akan mengalami tekanan yang besar di dasar kolom fluida dibandingkan dengan ketika berada di dekat permukaan. Perbedaan tekanan ini merupakan gaya resultan yang cenderung mempercepat pergerakan benda ke atas atau menjadikan percepatan ke bawah dari suatu benda berkurang hingga nol dan mencapai kelajuan terminal. Besarnya gaya apung sebanding dengan besarnya beda tekanan antara permukaan dan dasar kolom, dan setara dengan berat fluida yang terpindahkan (displacement) yang seharusnya mengisi ruang yang ditempati oleh benda. Sehingga benda yang memiliki massa jenis lebih besar dari fluida akan tenggelam, dan benda yang memiliki massa jenis lebih rendah dari fluida akan mengapung.

Sebuah benda yang tenggelam seluruhnya atau sebagian dalam suatu fluida akan mendapatkan gaya angkat ke atas yang sama besar dengan berat fluida fluida yang dipindahkan. Besarnya gaya ke atas menurut Hukum Archimedes ditulis dalam persamaan :

$Fa = \rho \, v \, g$



Keterangan :

Fa = gaya ke atas (N)

V = volume benda yang tercelup (m3)

ρ = massa jenis zat cair (kg/m3)

g = percepatan gravitasi (N/kg)

Daya apung (bouyancy) ada 3 macam, yaitu :

1. Daya apung positif (positive bouyancy) : bila suatu benda mengapung.

2. Daya apung negatif (negative bouyancy) : bila suatu benda tenggelam.
3. Daya apung netral (neutral bouyancy) : bila benda dapat melayang.

Konsep Melayang, Tenggelam dan Terapung.

a. Benda dapat terapung bila massa jenis benda lebih besar dari massa jenis zat cair.
b. Benda dapat terapung bila massa jenis benda lebih kecil dari massa jenis zat cair.
c. Benda dapat melayang bila massa jenis benda sama dengan massa jenis zat cair.
d. Benda dapat tenggelam bila massa jenis benda lebih besar dari massa jenis zat cair.
e. Terapung, melayang dan tenggelam dipengaruhi oleh volume benda. (miskonsepsi).
f. Terapung, melayang dan tenggelam dipengaruhi oleh berat dan massa benda.

2.8 Solidworks

SolidWorks adalah apa yang kita sebut “parametrik” modelling yang solid yang diperuntukan untuk pemodelan desain 3-D. Parametrik sendiri itu berarti bahwa dimensi dapat memiliki hubungan antara satu dengan yang lainnya dan dapat diubah pada saat proses desain dan secara otomatis mengubah part solid dan dokumentasi terkait (blueprint).

SolidWorks sendiri adalah software program mekanikal 3D CAD (computer aided design) yang berjalan pada Microsoft Windows. file SolidWorks menggunakan penyimpanan file format Microsoft yang terstruktur. Ini berarti bahwa ada berbagai file tertanam dalam setiap SLDDRW (file gambar), SLDPRT (part file), SLDASM (file assembly), dengan bitmap preview dan metadata sub-file.

Berbagai macam tools dapat digunakan untuk mengekstrak sub-file, meskipun sub-file dalam banyak kasus menggunakan format file biner. SolidWorks adalah parasolid yang berbasis solid modelling, dan menggunakan pendekatan berbasis fitur-parametrik untuk

membuat model dan assembly atau perakitan. Parameter mengacu pada pembatasan yang bernilai menentukan bentuk atau geometri dari model. Parameter dapat berupa numerik, seperti panjang garis atau diameter lingkaran, atau geometris, seperti tangen, paralel, konsentris, horizontal atau vertikal. parameter numerik dapat dikaitkan dengan satu sama lain melalui penggunaan hubungan, yang memungkinkan mereka untuk menangkap maksud dari desain.

SolidWork terdiri dari beberapa bagian :

1. Part adalah sebuah objek 3D yang terbentuk dari beberapa fitur. Sebuah Part dapat menjadi sebuah komponen pada suatu assembly, dan biasa juga digambarkan dalam bentuk 2D pada sebuah drawng. Fitur adalah benukan operasi-operasi yang membentuk Part. Base Feature adalah fitur yang pertama kali dibuat.Ekstensi File SolidWork adalah SLDPRT.
2. Assembly adalah sebuah dokumen dimana part, feature dan assembly lain (Sub Assembly) disatukan bersama. Ekstensi file untuk SolidWork Assembly adalah SLDASM.
3. Drawing adalah gambaran 2D dari sebuah 3D part maupun assembly, ekstensi File untuk Solidwork Drawing adalah SLDDRW.

“halaman ini sengaja dikosongkan”

BAB III
METODOLOGI

Untuk mendukung keberhasilan dalam proses penelitian yang dilaksanakan, maka perlu adanya kejelasan alur penelitian dalam yang menjadi acuan adlam pengerjaan skipsi. Kejelaan alur penelitian ini menjelaskan tentang tahapan-tahapan yang dilaksanakan selama proses penelitian, mulai dari identifikasi masalah, simulasi menggunakan software solidwork, kesimpulan hingga proses penyusunan Laporan Tugas Akhir.

3.1 Tahap Awal

Pada tahap awal pengerjaan skripsi ini difokuskan pada mengidentifikasi dan merumuskan masalah yang terjadi. Perumusan masalah ini terkait dengan data lengan cadik, kekutan lengan cadik dan material dari lengan cadik.

Pemahaman teori dasar tentang lengan cadik diperoleh dari materi-materi penunjang seperti dari buku maupun media web page. Adapun sumber-sumber referensi diantaranya berbentuk buku, jurnal, e-mail, e-book, dan e-news.

Kemudian tahap berikutnya adalah pengumpulan data. Pengumpulan data yang dimaksud antara lain dimensi jukung dan lengan cadik, spesifikasi material lengan cadik, profil lengan cadik yang nantinya data-data tersebut akan disimulasikan pada solidwork.

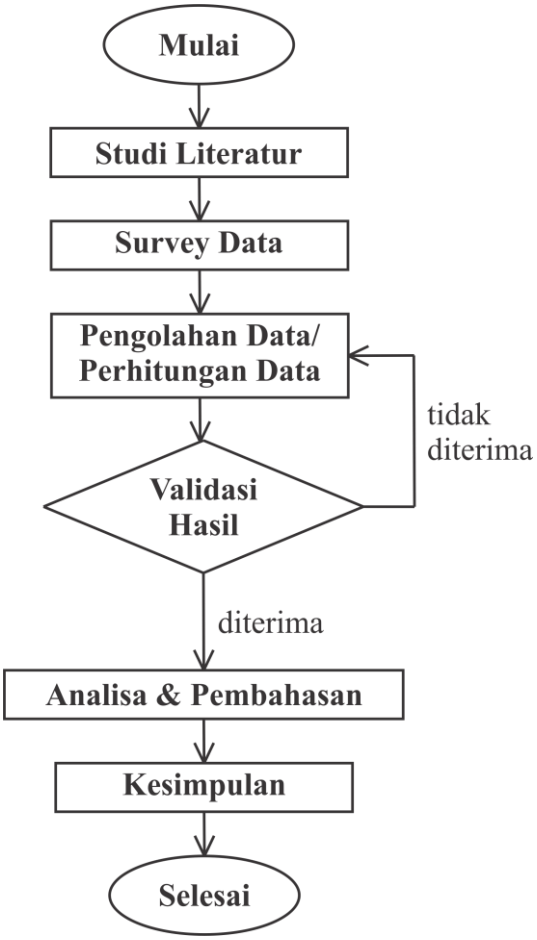
3.2 Simulasi Model

3.2.1 Penggambaran Model

Langkah selanjutnya adalah menghitung besar bouyancy yang terjadi akibat rolling dan kemudian membuat model 2 dimensi lengan cadik pada solidwork. Setelah itu memvariabelkan berdasarkan tebal lengan cadik yang diinginkan sesuai dengan data yang dibutuhkan. Setelah itu divariasikan profil lengan cadik yang dibutuhkan yaitu I bar dan T bar.

3.2.2 Simulasi Model

Untuk mensimulasikan model pada solidwork perlu beberapa tahapan yang harus dilakukan antara lain, membuat model geometri lengan cadik yang akan dianalisa. Kemudian menentukan material, menentukan fix geometry, menentukan bagian dari lengan cadik yang menerima bouyancy dan safety factor. Nanrinya dari hasil simulasi akan mendapatkan hasil distribusi tegangan yang terjadi pada lengan cadik setelah diberi beban dan perubahan bentuk yang terjadi pada lengan cadik.



Gambar 3. 1 Diagram Alur No.1

3.3 Analisa Model dan Kesimpulan

Untuk mensimulasikan model pada solidwork perlu beberapa tahapan yang harus dilakukan antara lain, membuat model geometri lengan cadik yang akan dianalisa. Kemudian menentukan material, menentukan fix geometry, menentukan bagian dari lengan cadik yang menerima bouyancy dan safety factor. Nanrinya dari hasil simulasi akan mendapatkan hasil distribusi tegangan yang terjadi pada lengan cadik setelah diberi beban dan perubahan bentuk yang terjadi pada lengan cadik.

“halaman ini sengaja dikosongkan”

BAB IV
PERHITUNGAN DAN ANALISA

4.1 Umum

Pada bab ini akan dijelaskan cara pengambaran model cadik yang menjadi objek pengamatan pada skripsi ini. Perancangan didasarkan pada batasan masalah pada bab awal skripsi ini. Beberapa tahapan yang akan dijelaskan mulai dari proses penggambaran 2D sampai dengan proses running model. Data yang didapat dari hasil running model nantinya akan digunakan untuk proses analisa dan kesimpulan pada skripsi ini.

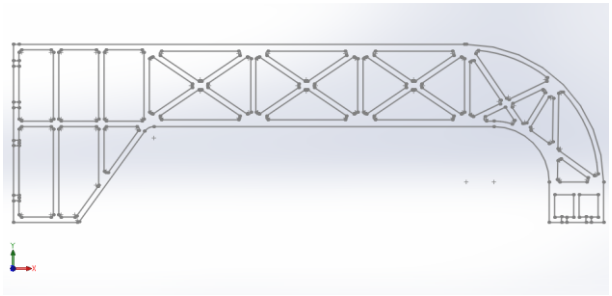
4.2 Variasi Sudut Kemiringan, Lebar, dan Jenis Profil

Variasi rolling pada jukung adalah 1°, 2°, 3°, 4°, 5° dan 6°, hal ini dilakukan sebagai bentuk gambaran gaya yang diterima cadik saat terkena gelombang air laut. Variasi yang dilakukan bukan hanya pada kemiringan melainkan juga ketebalan profil cadik yaitu 80 mm, 100 mm, dan 120 mm. Berikutnya variasi profil yang digunakan yaitu I bar dan T bar. Variasi-variasi ini dilakukan untuk mendapatkan hasil yang optimal mengenai tebal dan jenis profil cadik yang digunakan untuk mengurangi cost dalam proses produksi cadik.

4.3 Penggambaran Model

4.3.1 Penggambaran Model 2D

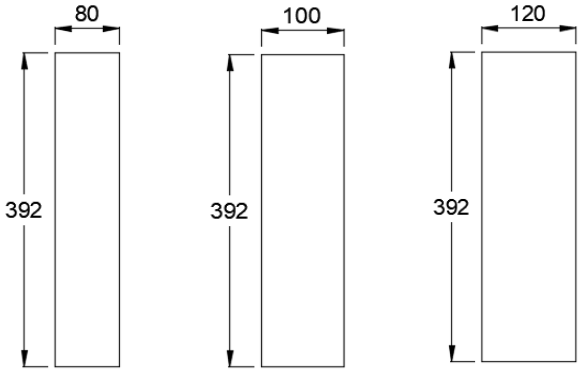
Tahap awal yang dilakukan dalam merancang lengan cadik ini adalah pembuatan model 2D dengan ukuran yang diperoleh dari studi literature tentang lengan cadik yang akan digunakan.



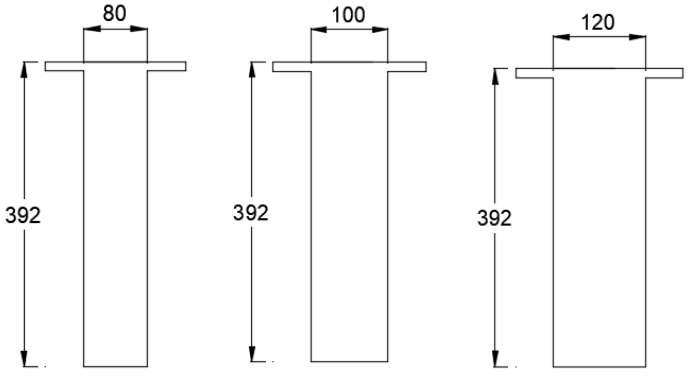
Gambar 4. 1 2D Lengan Cadik

4.3.2 Penentuan Profil

Setelah pengambaran model 2D selsai maka yang dilakukan selanjutnya adalah memilih profil yang akan digunakan. Terdapat 2 profil kan diuji pada percobaan ini yaitu I bar dan T bar. Dimana nantinya pada setiap profil akan dilihat kekuatannya. Berikut macam-macam profil yang digunakan:



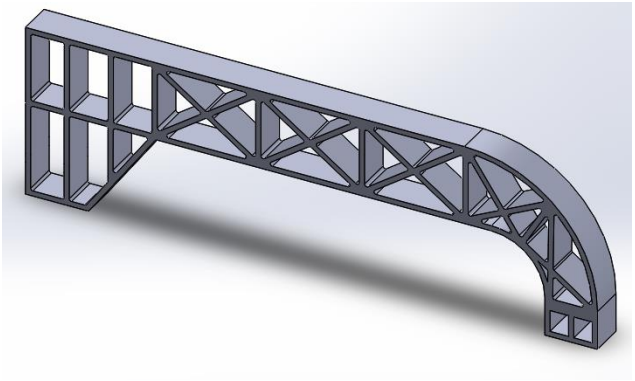
Gambar 4. 2 Profil I bar



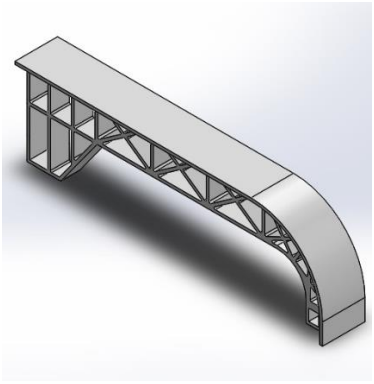
Gambar 4. 3 Profil T bar

4.3.3 Pemodelan pada Solidwork

Setelah menentukan profil yang akan digunakan maka yang dilakukan selanjutkan adalah extrude gambar dengan variasi tebal yang diinginkan yaitu 80mm, 100mm, atau 120 mm. Untuk gambar dibawah ini profil yang digunakan adalah profil I bar dan T bar dengan ketebalan 80 mm.



Gambar 4. 4 Lengan cadik I bar tebal 80 mm



Gambar 4. 5 Lengan cadik T bar tebal 80 mm

4.4 Perhitungan Daya Apung

Dalam menentukan daya apung (bouyancy) digunakan rumus :

$$Fa = \rho \times v \times g$$

Dimana :

Fa = gaya ke atas (N)

ρ = massa jenis zat cair (kg/m3)

V = volume benda yang tercelup (m3)

g = percepatan gravitasi (N/kg)

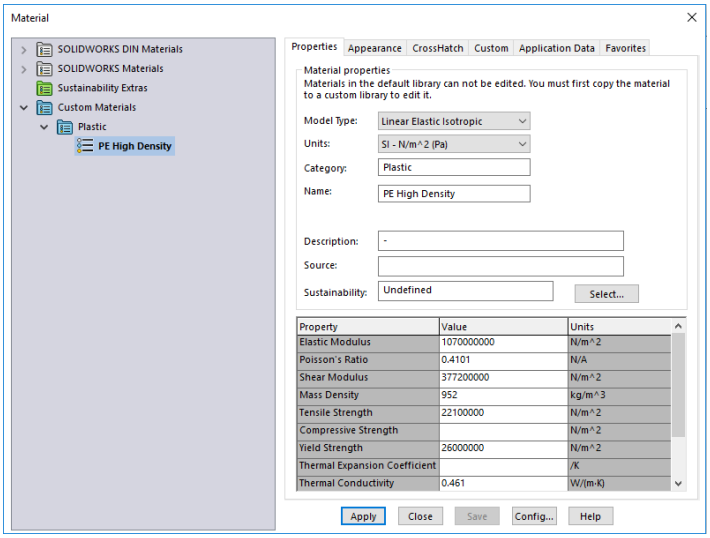
Berikut hasil perhitungan buoyancy pada jukung :

Tabel 4. 1 Perhitungan Daya Apung

Kemiringan	Volume benda yang tercelup		Bouyancy (N)	
	Ø 1	Ø 2	Ø 1	Ø 2
1°	0,22	0,01	2250,47	133,55
2°	0,22	0,04	2250,47	361,76
3°	0,22	0,06	2250,47	633,36
4°	0,22	0,09	2250,47	916,04
5°	0,22	0,12	2250,47	1213,18
6°	0,22	0,15	2250,47	1482,27

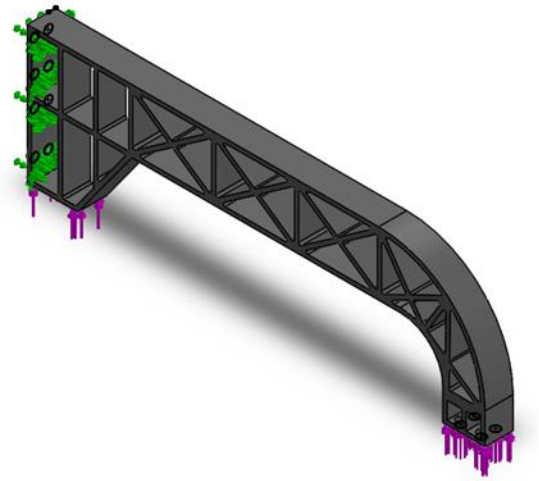
4.5 Simulasi pada Solidwork

Setelah selesai melakukan perhitungan bouyancy yang diterima pada sisi lengan cadik, langkah selanjutnya adalah pemilihan material yang akan digunakan lengan cadik yang telah digambar.



Gambar 4. 6 Material PE High Density

Setelah memilih material yang kan digunakan maka proses berikutnya adalah penempatan beban, atau gaya yang diterima lengan cadik.



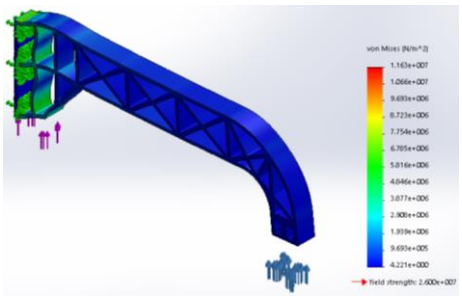
Gambar 4. 7 Lengan cadik yang telah diberi gaya

Langkah berikutnya yang dilakukan adalah running model. Hal ini dilakukan untuk mengetahui dampak terhadap model saat diberikan gaya pada beberapa bagian. Berikut hasil running model dengan dengan kondisi rolling 1°, 2°, 3°, 4°, 5° dan 6°.

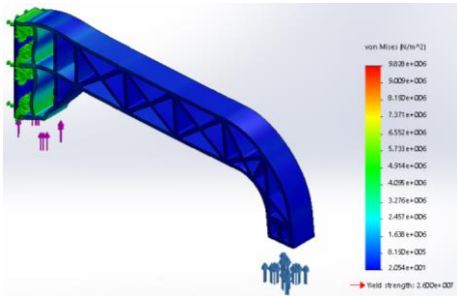
4.5.1 Tegangan (Stress)

Adalah kumpulan gaya (force) pada suatu permukaan benda. Semakin sempit luasan permukaan namun gaya tetap, maka tegangan semakin besar. Tegangan terbesar ditunjukkan pada gradasi warna paling merah, terkecil adalah warna biru. Sedangkan area dengan tegangan sedang adalah area dengan warna kuning-hijau-biru muda.

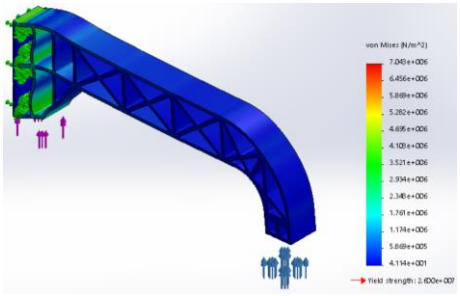
- Sudut Rolling 1°



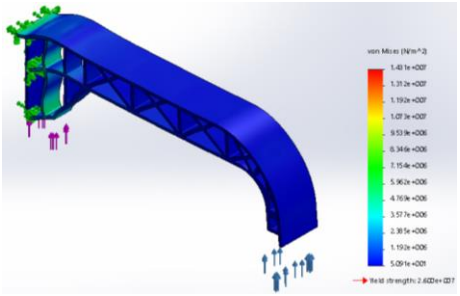
I bar 80 mm



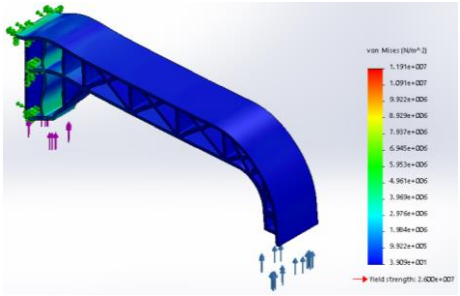
I bar 100 mm



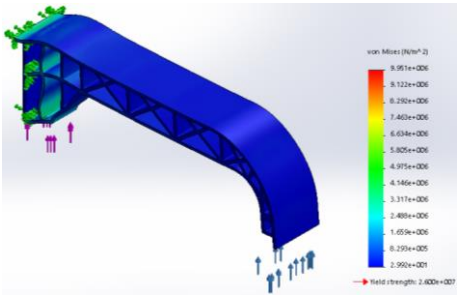
I bar 120 mm



T bar 80 mm



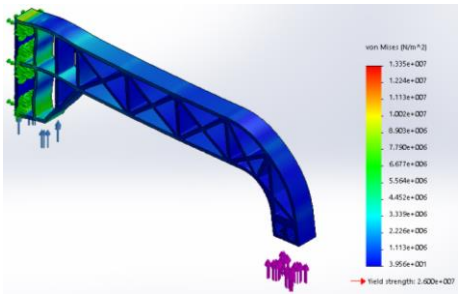
T bar 100 mm



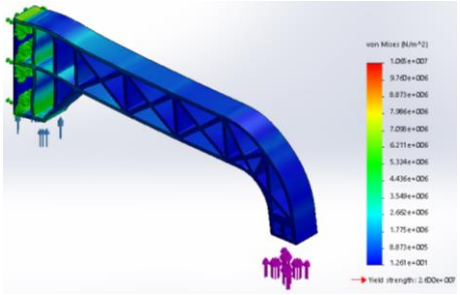
T bar 120 mm

Gambar 4. 8 Tegangan pada lengan cadik dengan sudut rolling 1°

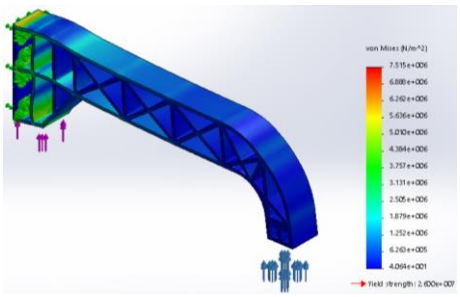
- Sudut Rolling 2°



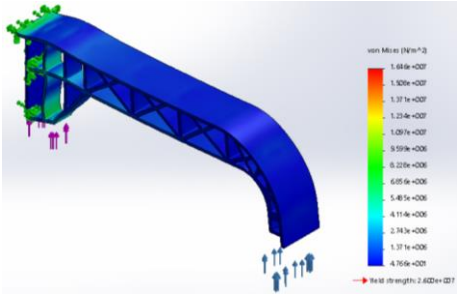
I bar 80 mm



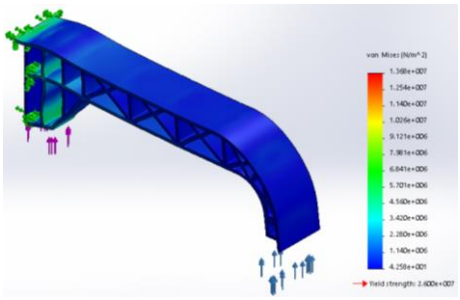
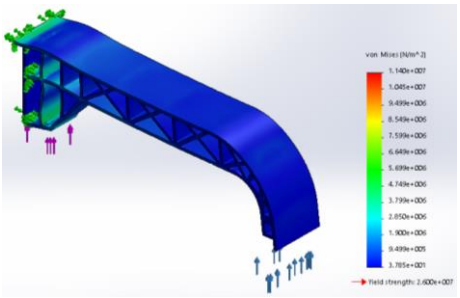
I bar 100 mm



I bar 120 mm



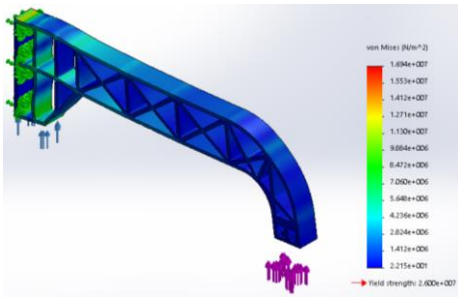
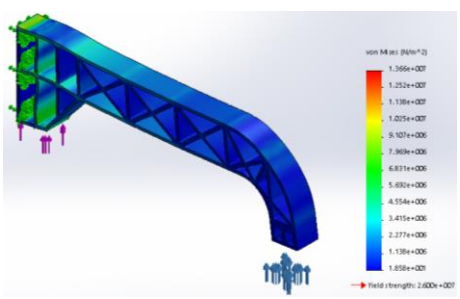
T bar 80 mm

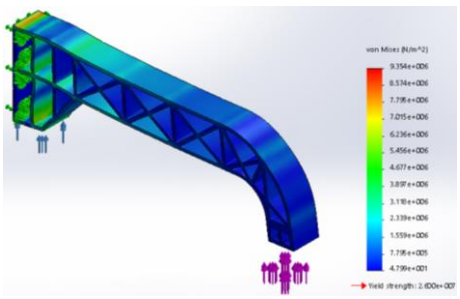
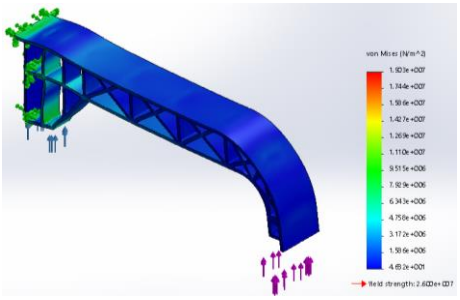
T bar 100 mm T bar 120 mm

Gambar 4. 9 Tegangan pada lengan cadik sudut rolling 2°

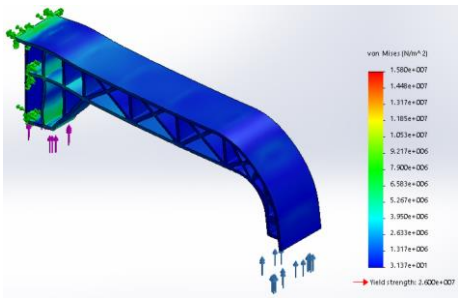
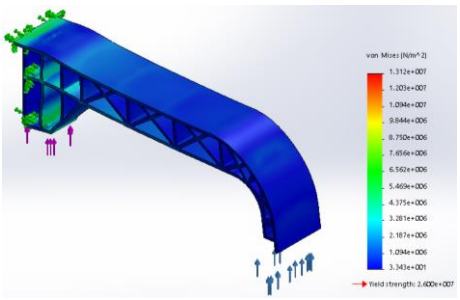
- Sudut Rolling 3°

I bar 80 mm I bar 100 mm

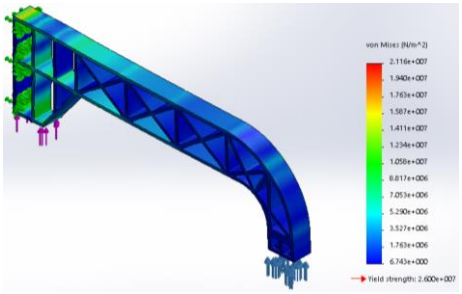
I bar 120 mm T bar 80 mm

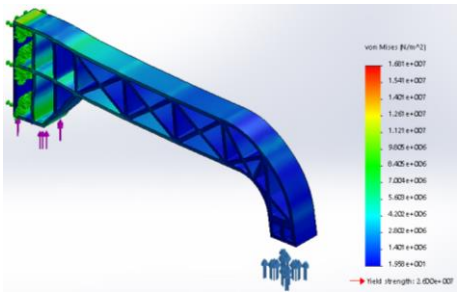
T bar 100 mm T bar 120 mm

Gambar 4. 10 Tegangan pada lengan cadik sudut rolling 3°

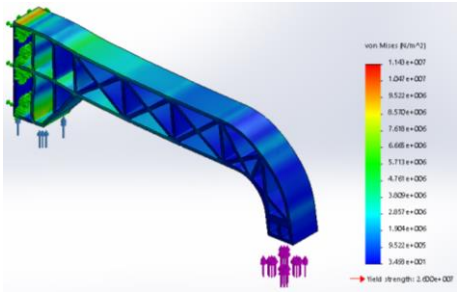
➢ Sudut Rolling 4°



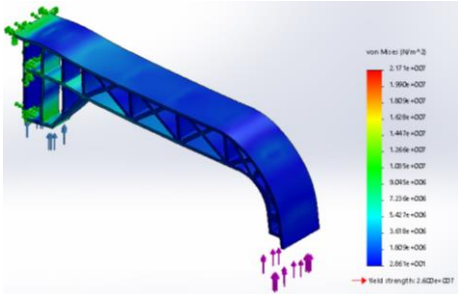
I bar 80 mm



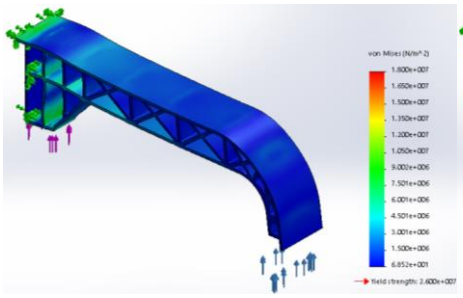
I bar 100 mm



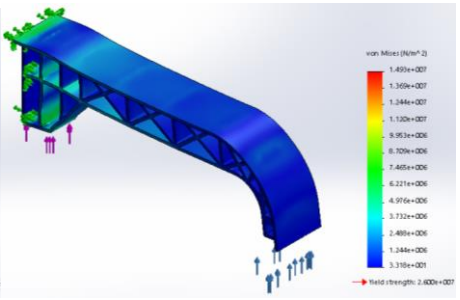
I bar 120 mm



T bar 80 mm



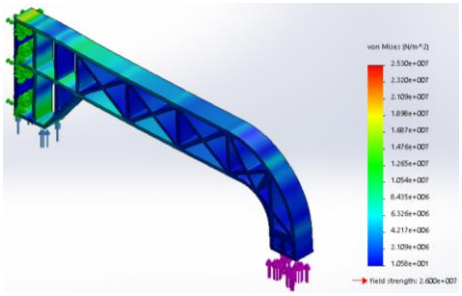
T bar 100 mm



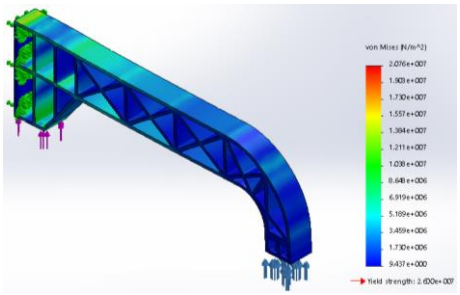
T bar 120 mm

Gambar 4. 11 Tegangan pada lengan cadik sudut rolling 4°

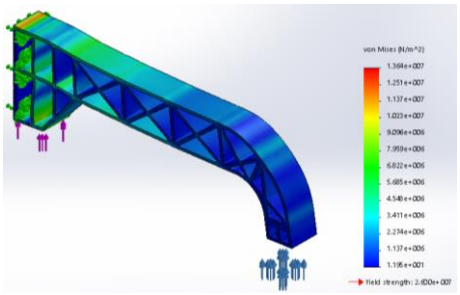
➢ Sudut Rolling 5°



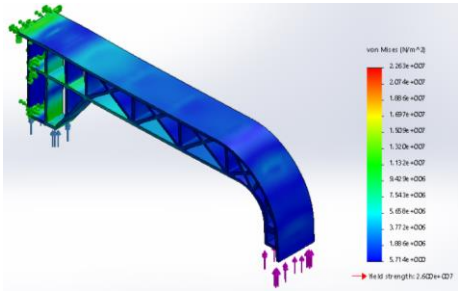
I bar 80 mm



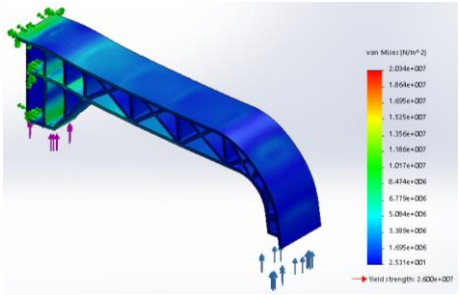
I bar 100 mm



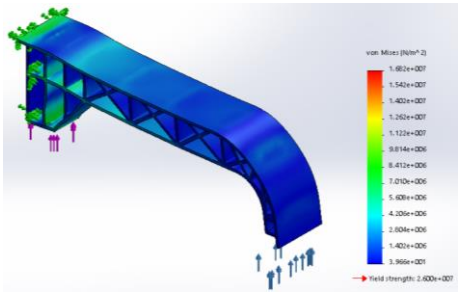
I bar 120 mm



T bar 80 mm



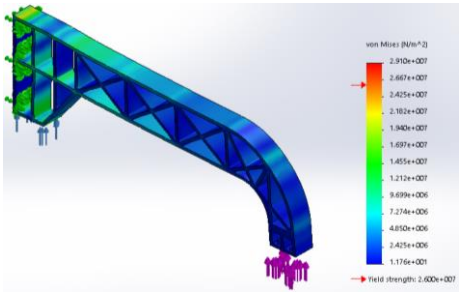
T bar 100 mm



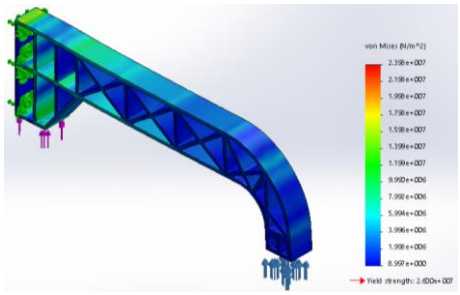
T bar 120 mm

Gambar 4. 12 Tegangan pada lengan cadik sudut rolling 5°

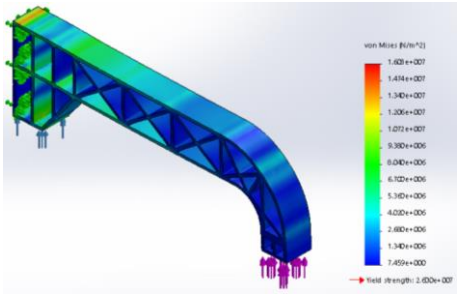
- Sudut Rolling 6°



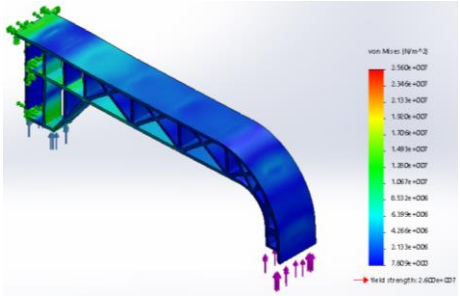
I bar 80 mm



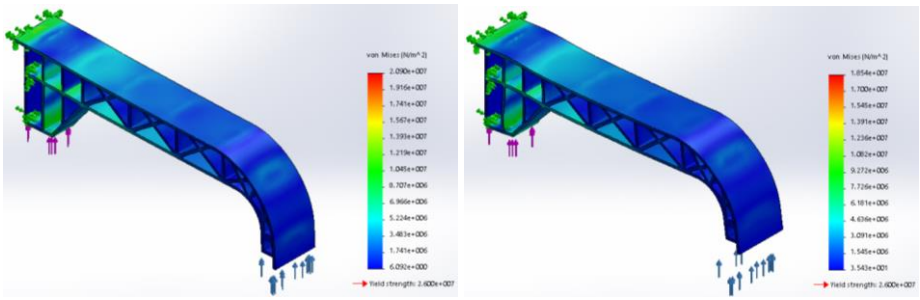
I bar 100 mm



I bar 120 mm



T bar 80 mm



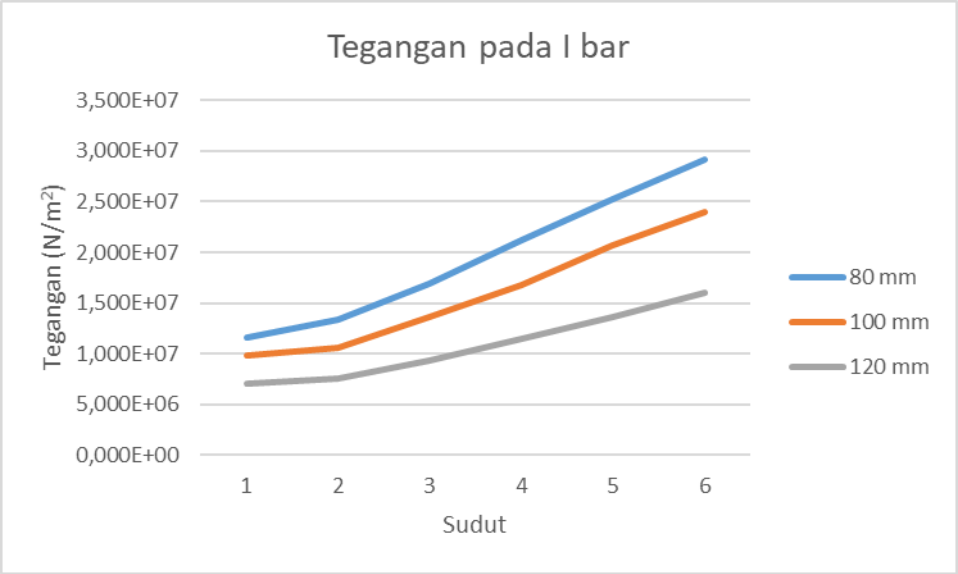
T bar 100 mm T bar 120 mm

Gambar 4. 13 Tegangan pada lengan cadik sudut rolling 6°

Dari ke 36 percobaan memiliki kesamaan yaitu letak tegangan terbesar berada pada lengan cadik yang berada mendekati cadik. Sementara sisi lain dari lengan cadik tidak menerima tegangan yang cukup besar. (N/m^2)
Berikutnya untuk lengan cadik dengan tebal 80 mm, 100 mm dan 120 mm akan ditunjukkan dengan tabel.

Tabel 4. 2 Hasil Simulasi Tekanan I Bar

HASIL PENGUJIAN I BAR						
Sudut	Tebal					
	80 mm		100 mm		120 mm	
	Nilai Stress (KN/m2)					
	Min	Max	Min	Max	Min	Max
1°	4,221	1,163E+07	20,54	9,828E+06	41,14	7,043E+06
2°	39,56	1,335E+07	12,61	1,065E+07	40,64	7,515E+06
3°	22,15	1,694+007	18,58	1,366E+07	47,99	9,354E+06
4°	6,743	2,116E+07	19,58	1,681E+07	34,93	1,143E+07
5°	10,58	2,530E+07	9,44	2,076E+07	11,95	1,364E+07
6°	11,76	2,91E+07	9,00	2,398E+07	7,46	1,608E+07

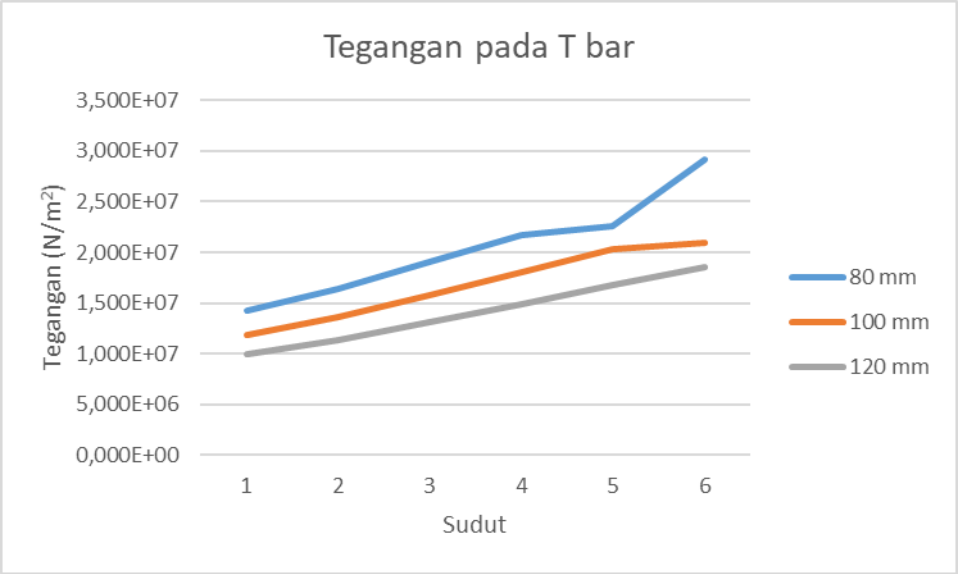


Gambar 4. 14 Grafik Tegangan pada profil I bar

Tegangan paling tinggi terjadi pada profil I bar dengan tebal 80 mm sebesar 29,1 Mpa melebihi yield dari material sendiri yang hanya sebesar 26 Mpa. Sementara untuk pengujian lain masih didalam batas normal sebab nilai tekanan tetinggi masih dibawah batas yield dari material HDPE. Yang berarti bahwa lengan cadik dengan ketebalan 80 mm akan terjadi patah jika jukung rolling sebesar 6°.

Tabel 4. 3 Hasil Simulasi Tekanan T Bar

HASIL PENGUJIAN T BAR						
Sudut	Tebal					
	80 mm		100 mm		120 mm	
	Nilai Stress (KN/m2)					
	Min	Max	Min	Max	Min	Max
1°	50,91	1,431E+07	39,09	1,191E+07	29,92	9,951E+06
2°	47,66	1,646E+07	42,58	1,368E+07	37,85	1,140E+07
3°	46,82	1,903E+07	31,37	1,580E+07	33,43	1,312E+07
4°	28,61	2,171E+07	68,52	1,800E+07	33,18	1,493E+07
5°	5,71	2,263E+07	25,31	2,034E+07	39,66	1,682E+07
6°	7,81	2,910E+07	6,09	2,090E+07	35,43	1,854E+07



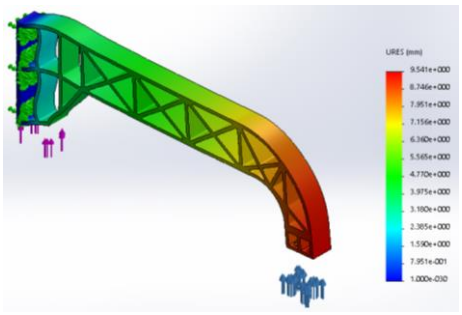
Gambar 4. 15 Grafik Tegangan pada profil T bar

Tegangan paling tinggi terjadi pada profil T bar dengan tebal 80 mm sebesar 29,1 Mpa melebihi yield dari material sendiri yang hanya sebesar 26 Mpa. Sementara untuk pengujian lain masih didalam batas normal sebab nilai tekanan tetinggi masih dibawah batas yield dari material HDPE. Yang berarti bahwa lengan cadik dengan ketebalan 80 mm akan terjadi patah jika jukung rolling sebesar 6°.

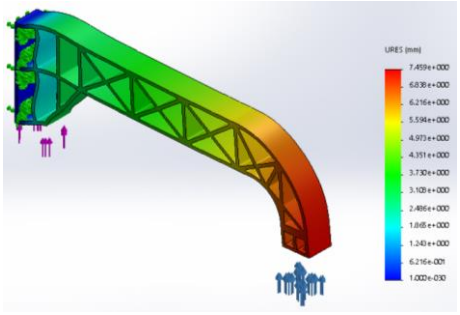
4.5.2 Displacement

Displacement adalah perubahan bentuk pada benda yang dikenai gaya. Dalam hal ini, melengkung. Bagian yang paling melengkung dari lengan cadik ini adalah daerah berwarna paling merah pada lengan cadik yg tersambung langsung dengan cadik, dan pada bagian yang paling lurus adalah bagian yang berwarna biru pada lengan cadik dekat penopang.

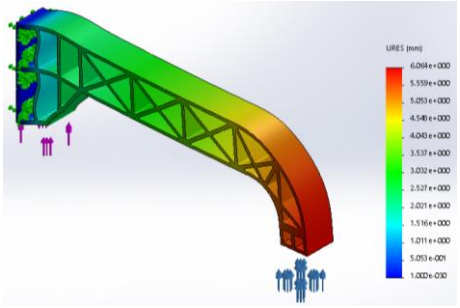
➢ Sudut Rolling 1



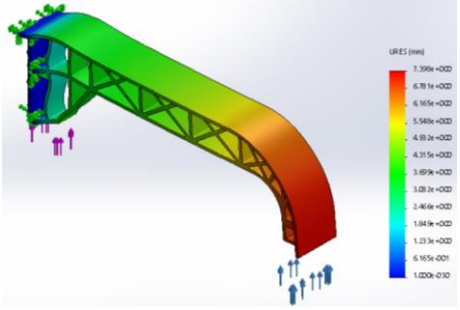
I bar 80 mm



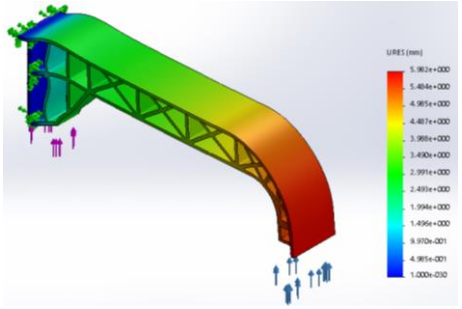
I bar 100 mm



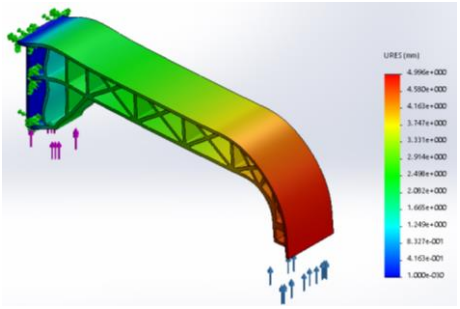
I bar 120 mm



T bar 80 mm



T bar 100 mm

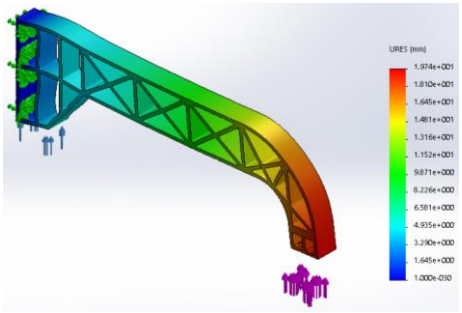


T bar 120 mm

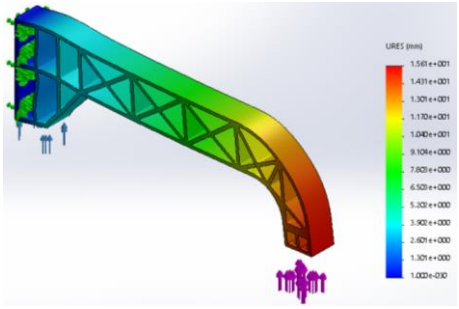
Gambar 4. 16 Perubahan bentuk pada lengan cadik sudut rolling 1°

Bagian yang paling melengkung dari lengan cadik ini adalah daerah berwarna paling merah. Dan dapat dilihat bahwa semakin tebal lengan cadik maka perubahan bentuk yang terjadi semakin kecil. Perubahan bentuk paling kecil terjadi pada lengan cadik profil T bar dengan tebal 120 mm sebesar 5 mm. Sedangkan bagian yang paling besar terjadi pada lengan cadik profil I bar dengan tebal 80 mm sebesar 9,54 mm.

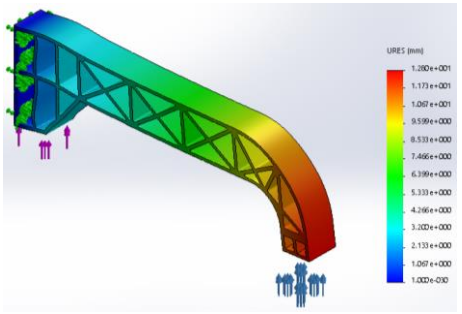
➢ Sudut Rolling 2



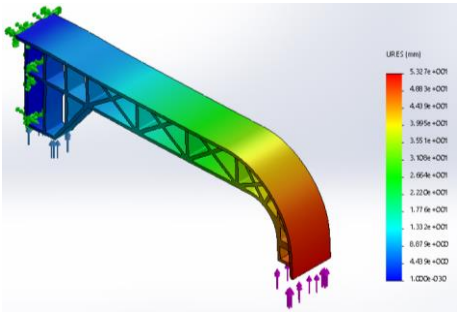
I bar 80 mm



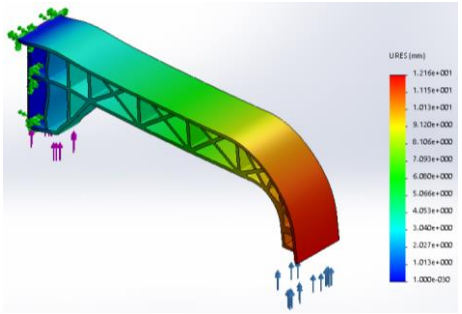
I bar 100 mm



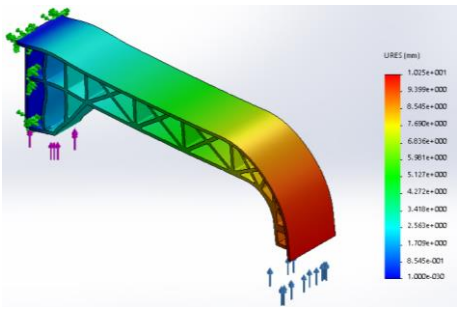
I bar 120 mm



T bar 80 mm



T bar 100 mm

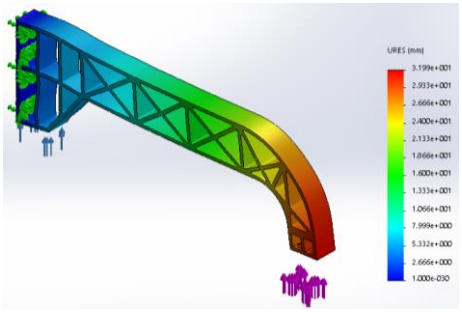


T bar 120 mm

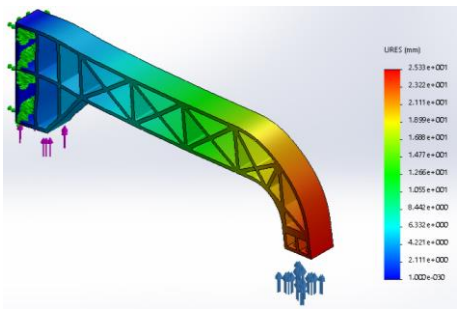
Gambar 4. 17 Perubahan bentuk pada lengan cadik rolling 2°

Bagian yang paling melengkung dari lengan cadik ini adalah daerah berwarna paling merah. Dan dapat dilihat bahwa semakin tebal lengan cadik maka perubahan bentuk yang terjadi semakin kecil. Perubahan bentuk paling kecil terjadi pada lengan cadik profil T bar dengan tebal 120 mm sebesar 10,25 mm. Sedangkan bagian yang paling besar terjadi pada lengan cadik profil I bar dengan tebal 80 mm sebesar 19,74 mm.

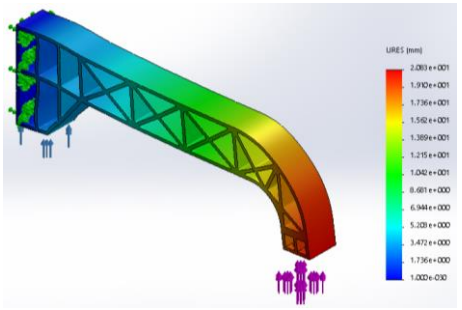
➢ Sudut Rolling 3



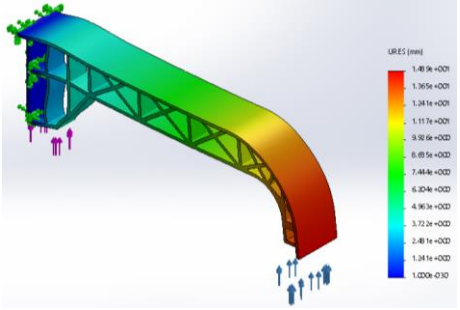
I bar 80 mm



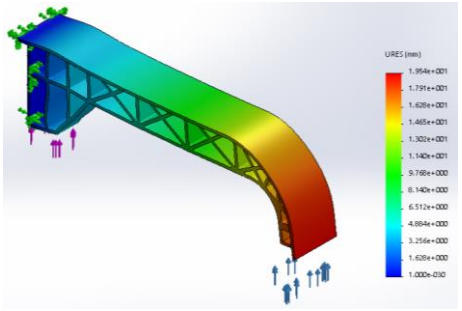
I bar 100 mm



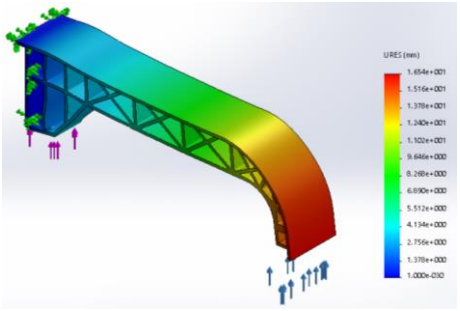
I bar 120 mm



T bar 80 mm



T bar 100 mm

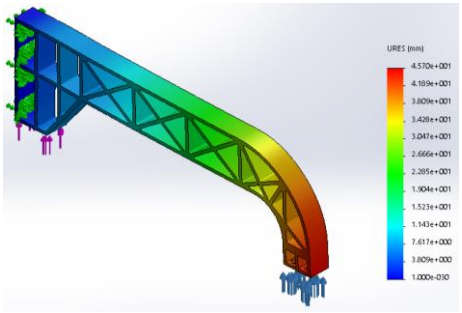


T bar 120 mm

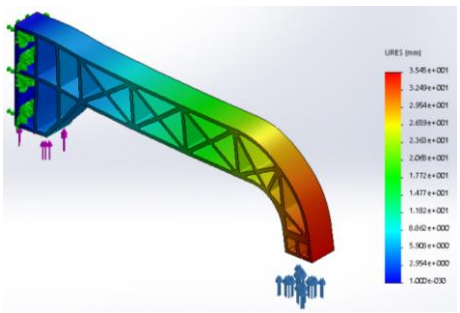
Gambar 4. 18 Perubahan bentuk pada lengan cadik rolling 3°

Bagian yang paling melengkung dari lengan cadik ini adalah daerah berwarna paling merah. Dan dapat dilihat bahwa semakin tebal lengan cadik maka perubahan bentuk yang terjadi semakin kecil. Perubahan bentuk paling kecil terjadi pada lengan cadik profil T bar dengan tebal 120 mm sebesar 16,54 mm. Sedangkan bagian yang paling besar terjadi pada lengan cadik profil I bar dengan tebal 80 mm sebesar 31,99 mm.

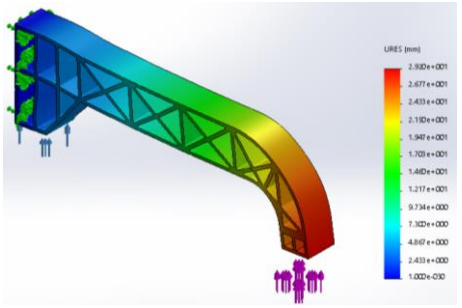
➢ Sudut Rolling 4



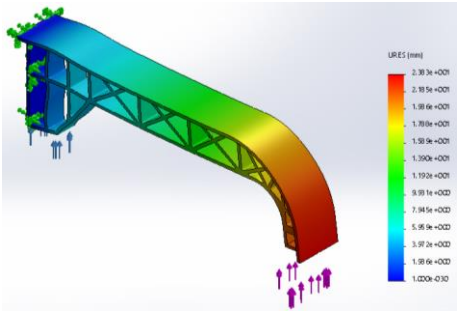
I bar 80 mm



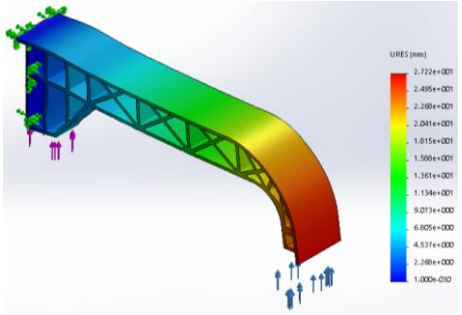
I bar 100 mm



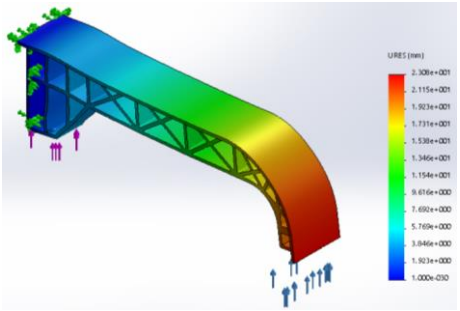
I bar 120 mm



T bar 80 mm



T bar 100 mm

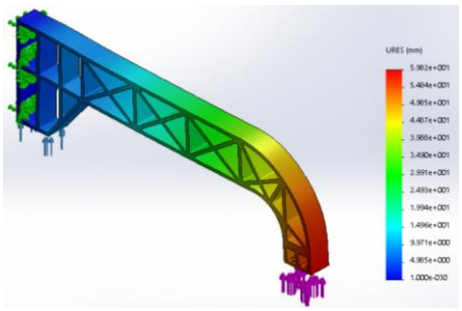


T bar 120 mm

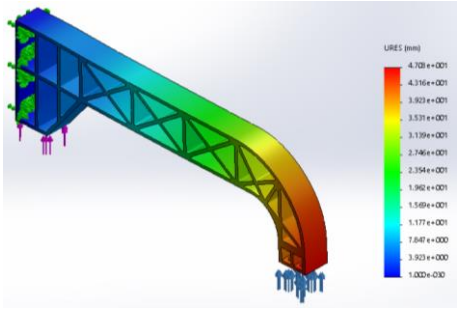
Gambar 4. 19 Perubahan bentuk pada lengan cadik rolling 4°

Bagian yang paling melengkung dari lengan cadik ini adalah daerah berwarna paling merah. Dan dapat dilihat bahwa semakin tebal lengan cadik maka perubahan bentuk yang terjadi semakin kecil. Perubahan bentuk paling kecil terjadi pada lengan cadik profil T bar dengan tebal 120 mm sebesar 23,08 mm. Sedangkan bagian yang paling besar terjadi pada lengan cadik profil I bar dengan tebal 80 mm sebesar 45,7 mm.

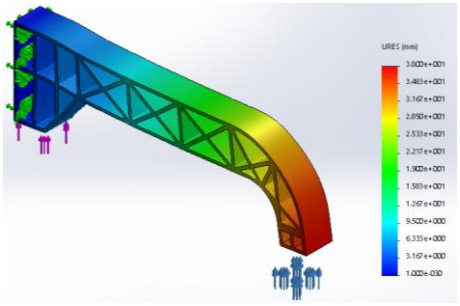
➢ Sudut Rolling 5



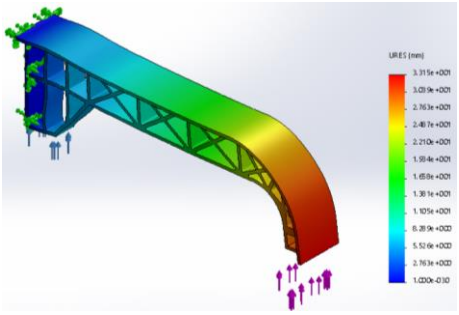
I bar 80 mm



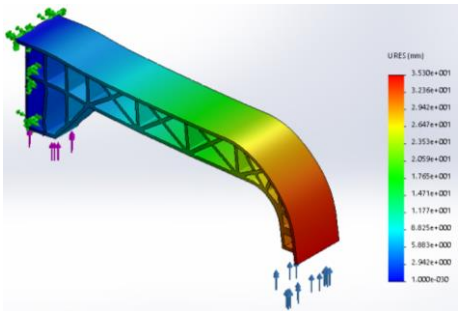
I bar 100 mm



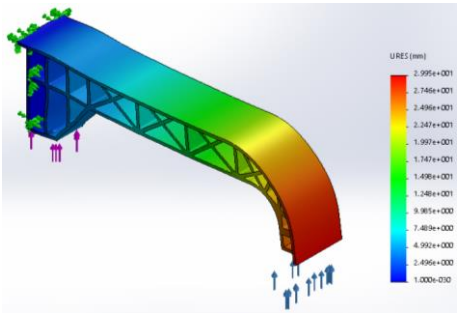
I bar 120 mm



T bar 80 mm



T bar 100 mm

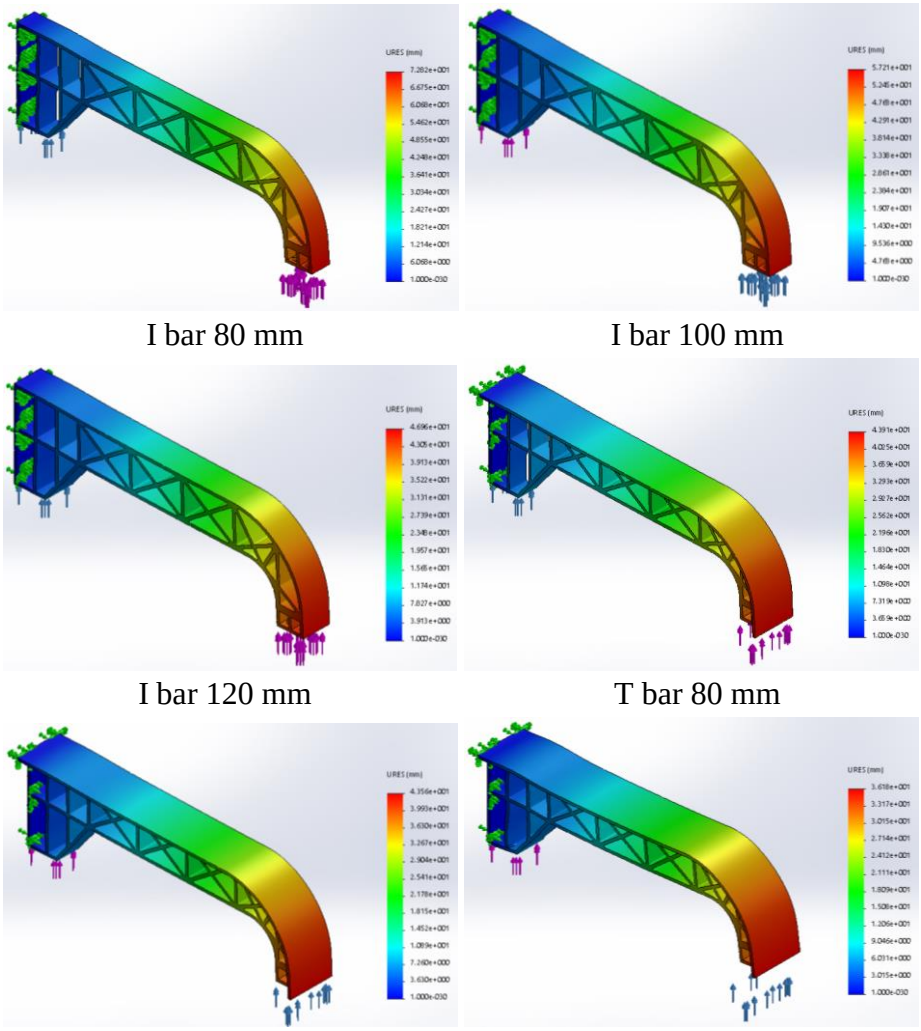


T bar 120 mm

Gambar 4. 20 Perubahan bentuk pada lengan cadik rolling 5°

Bagian yang paling melengkung dari lengan cadik ini adalah daerah berwarna paling merah. Dan dapat dilihat bahwa semakin tebal lengan cadik maka perubahan bentuk yang terjadi semakin kecil. Perubahan bentuk paling kecil terjadi pada lengan cadik profil T bar dengan tebal 120 mm sebesar 29,95 mm. Sedangkan bagian yang paling besar terjadi pada lengan cadik profil I bar dengan tebal 80 mm sebesar 59,82 mm.

➢ Sudut Rolling 6



I bar 80 mm | I bar 100 mm

I bar 120 mm | T bar 80 mm

T bar 100 mm | T bar 120 mm

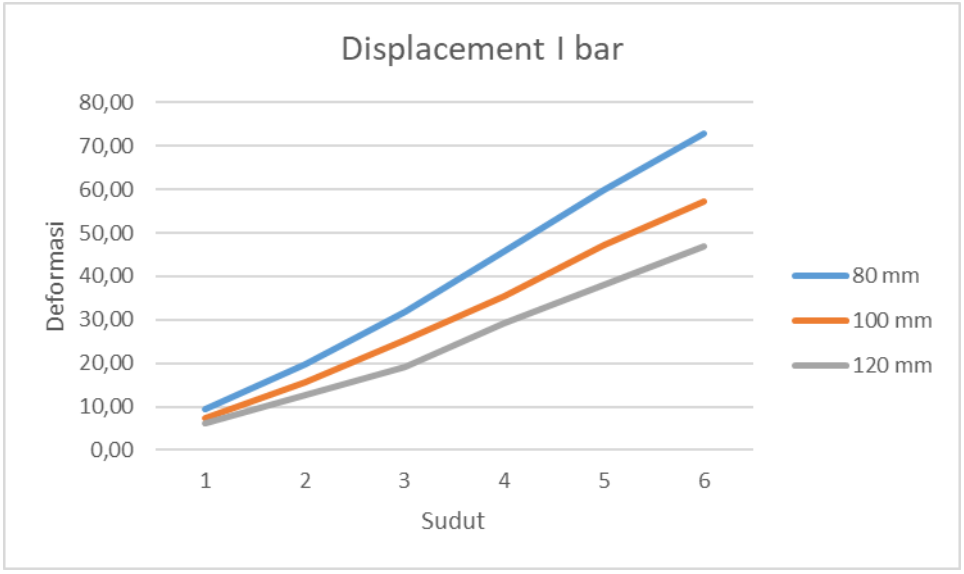
Gambar 4. 21 Perubahan bentuk pada lengan cadik rolling 6°

Bagian yang paling melengkung dari lengan cadik ini adalah daerah berwarna paling merah. Dan dapat dilihat bahwa semakin tebal lengan cadik maka perubahan bentuk yang terjadi semakin kecil. Perubahan bentuk paling kecil terjadi pada lengan cadik profil T bar dengan tebal 120 mm sebesar 53,27 mm. Sedangkan bagian yang paling besar terjadi pada lengan cadik profil I bar dengan tebal 80 mm sebesar 72,82 mm.

Dari 36 percobaan yang telah dilakukan memiliki kesamaan yaitu terjadi deformasi pada ujung lengan cadik yang terhubung pada cadik. Hal ini terjadi dikarenakan bagian tersebut menerima bouyancy secara langsung dari cadik akibat gelombang. Hal ini dapat dilihat bagian yang berwarna merah pada ujung lengan cadik. Berikutnya untuk lengan cadik dengan tebal 80 mm, 100 mm dan 120 mm akan ditunjukkan dengan tabel.

Tabel 4. 4 Perhitungan Displacement I bar

HASIL PENGUJIAN I BAR						
Sudut	Tebal					
	80 mm		100 mm		120 mm	
	Displacement (mm)					
	Min	Max	Min	Max	Min	Max
1°	0,00	9,54	0,00	7,459	0,00	6,064
2°	0,00	19,74	0,00	15,610	0,00	12,800
3°	0,00	31,99	0,00	25,330	0,00	19,190
4°	0,00	45,70	0,00	35,450	0,00	29,200
5°	0,00	59,82	0,00	47,080	0,00	38,000
6°	0,00	72,82	0,00	57,210	0,00	46,960



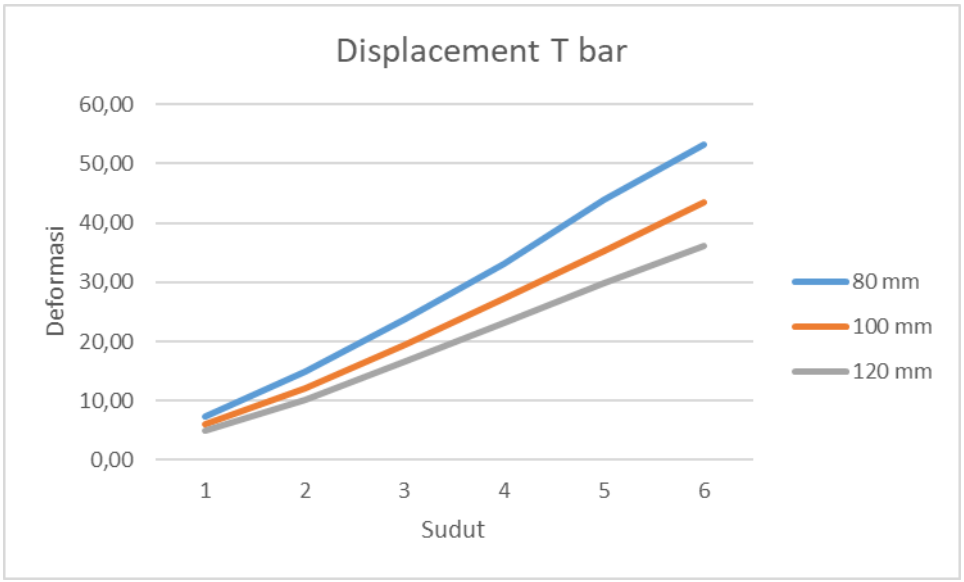
Gambar 4. 22 Grafik Displacement I bar

Dapat dilihat dari grafik diatas bahwa semakin besar kemiringan pada jukung maka berbanding lurus dengan besarnya deformasi yan terjadi pada lengan cadik. Hal ini dikarenakan bouyancy yang besar terjadi sudut kemiringan 6° pada jukung. Dan pada setiap ketebalan memiliki

besar deformasi yang berbeda-beda. Semakin tebal profil maka nilai deformasi yang terjadi semakin kecil. Deformasi terbesar terjadi pada profil I bar dengan ketebalan 80 mm dengan deformasi sebesar 72,82 mm.

Tabel 4. 5 Perhitungan Displacement T bar

HASIL PENGUJIAN T BAR						
Sudut	Tebal					
	80 mm		100 mm		120 mm	
	Displacement (mm)					
	Min	Max	Min	Max	Min	Max
1°	0,00	7,40	0,00	5,982	0,00	4,996
2°	0,00	14,89	0,00	12,160	0,00	10,250
3°	0,00	23,83	0,00	19,540	0,00	16,540
4°	0,00	33,15	0,00	27,220	0,00	23,080
5°	0,00	43,91	0,00	35,300	0,00	29,950
6°	0,00	53,27	0,00	43,560	0,00	36,180



Gambar 4. 23 Grafik Displacement T bar

Dapat dilihat dari grafik diatas bahwa semakin besar kemiringan pada jukung maka berbanding lurus dengan besarnya deformasi yan terjadi pada lengan cadik. Hal ini dikarenakan bouyancy yang besar terjadi sudut rolling 6° pada jukung. Dan pada setiap ketebalan memiliki besar deformasi yang berbeda-beda. Semakin tebal profil maka nilai

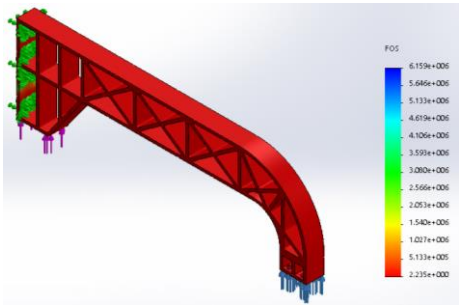
deformasi yang terjadi semakin kecil. Deformasi terbesar terjadi pada profil I bar dengan ketebalan 80 mm dengan deformasi sebesar 53,27 mm.

4.5.3 Safety Factor

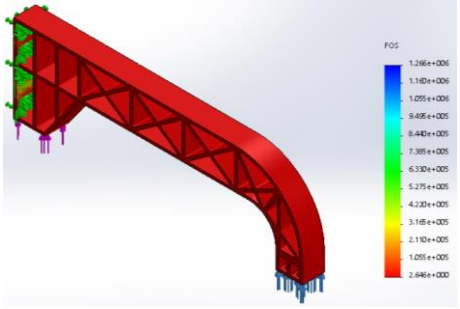
Safety Factor dalah patokan utama yang digunakan dalam menentukan kualitas lengan cadik. Patokannya, jika nilai FOS minimal kurang dari 1, maka lengan cadik tersebut kualitasnya jelek, tidak aman untuk digunakan, cenderung membahayakan, sebaliknya jika nilai FOS lebih dari 1 (biasanya antara 1-3) maka produk tersebut berkualitas baik, aman dan layak untuk digunakan.

Namun apabla nilai FOS minimal mencapai 3 digit atau lebih (misal 100 atau lebih) maka produk tersebut aman, berkualitas baik namun harganya sangat mahal dan cenderung berbobot besar, karena material yang digunakan terlalu banyak.

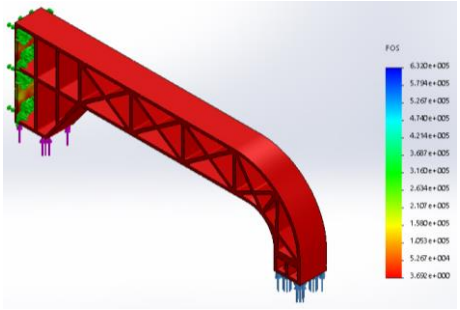
- Sudut Rolling 1



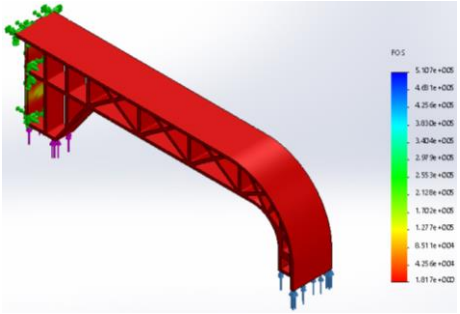
I bar 80 mm



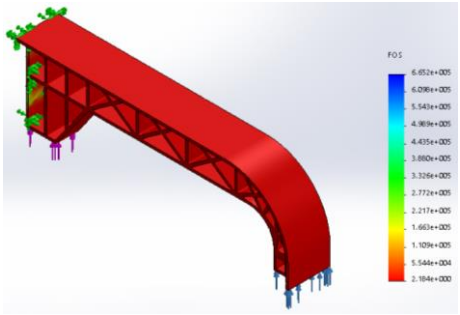
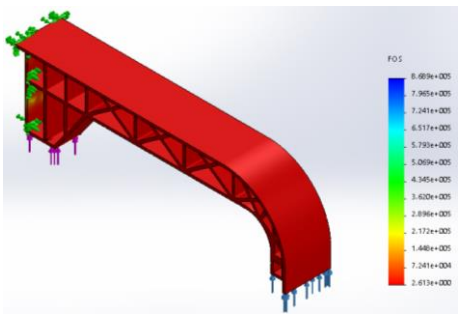
I bar 100 mm



I bar 120 mm



T bar 80 mm

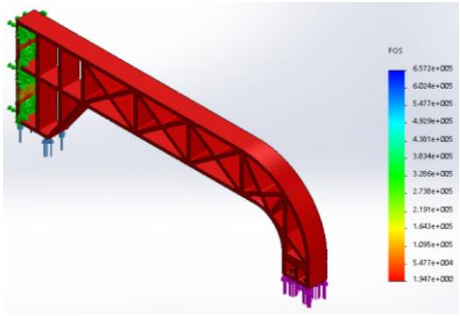
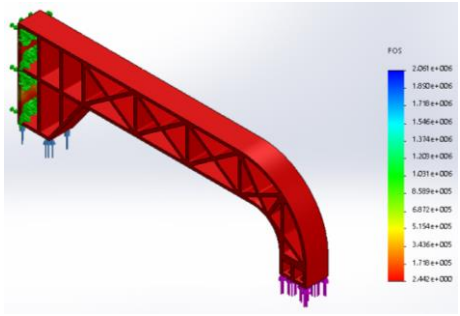



T bar 100 mm T bar 120 mm

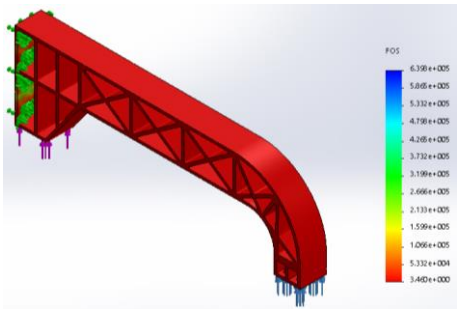
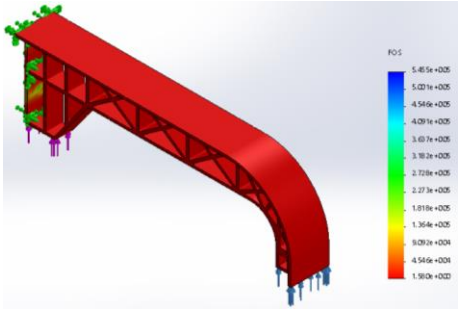
Gambar 4. 24 Safety Factor lengan cadik sudut rolling 1°

Pada rangka lengan cadik ini, nilai FOS terkecil adalah 1,8 pada lengan cadik dengan tebal 80 mm dengan profil T bar yang berarti rangka meja ini aman diberi beban statis. Sementara nilai FOS terbesar adalah 3,7 pada lengan cadik dengan tebal 120 mm dengan profil I bar yang berarti rangka meja ini aman diberi beban statis.

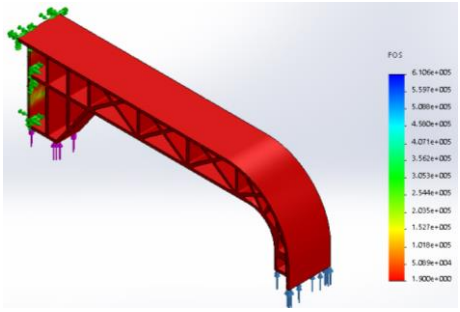
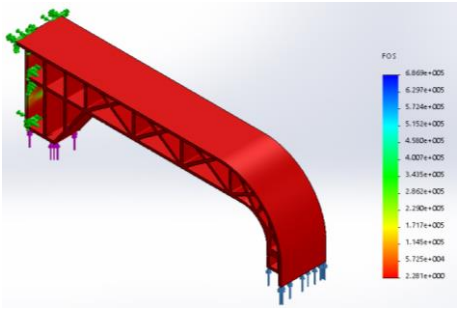
- Sudut Rolling 2

I bar 80 mm I bar 100 mm

I bar 120 mm T bar 80 mm

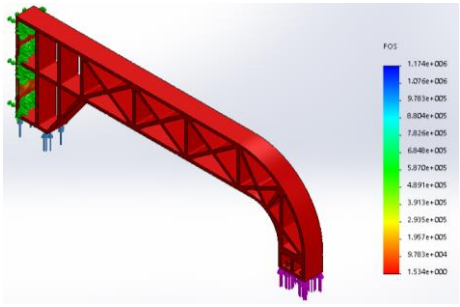
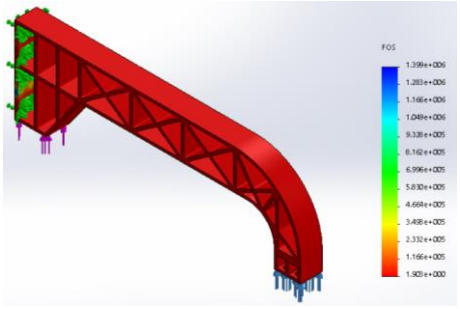



T bar 100 mm T bar 120 mm

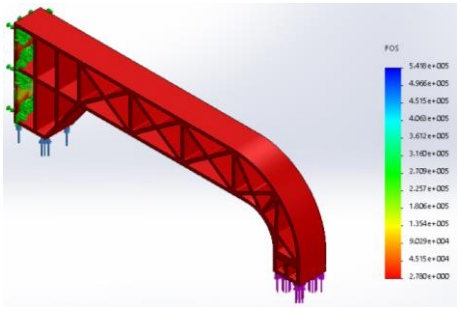
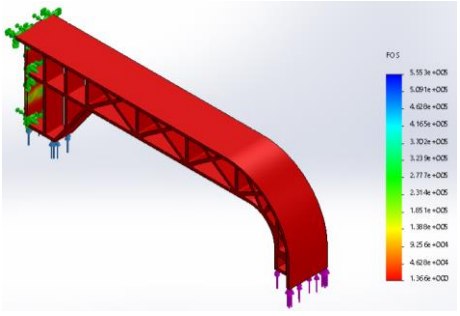
Gambar 4. 25 Safety Factor lengan cadik sudut rolling 2°

Pada rangka lengan cadik ini, nilai FOS terkecil adalah 1,6 pada lengan cadik dengan tebal 80 mm dengan profil T bar yang berarti rangka meja ini aman diberi beban statis. Sementara nilai FOS terbesar adalah 3,5 pada lengan cadik dengan tebal 120 mm dengan profil I bar yang berarti rangka meja ini aman diberi beban statis.

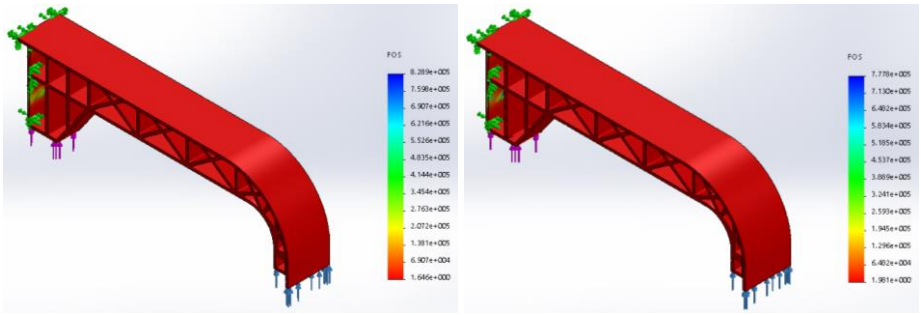
- Sudut Rolling 3

I bar 80 mm I bar 100 mm

I bar 120 mm T bar 80 mm

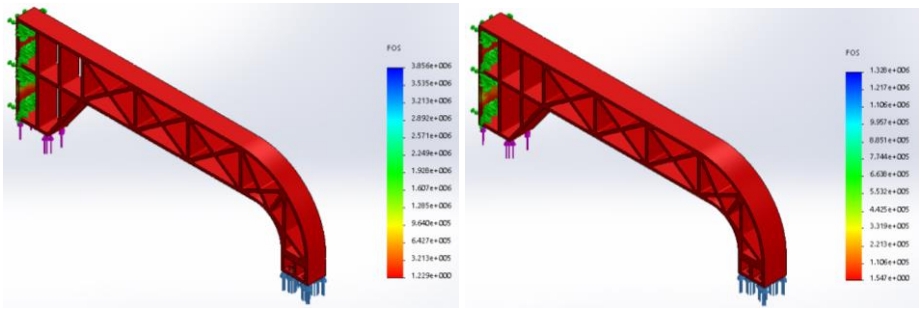


T bar 100 mm T bar 120 mm

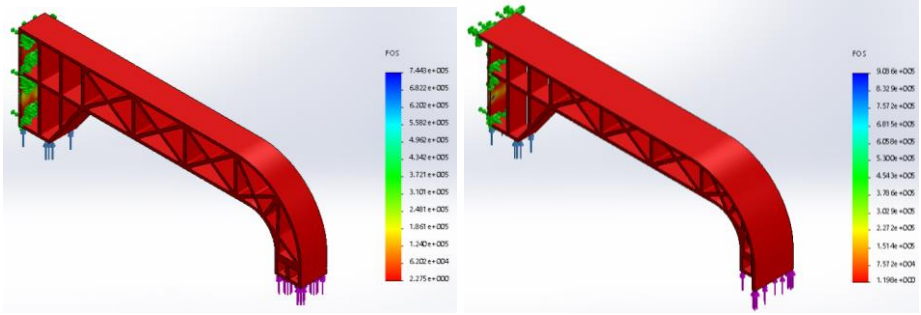
Gambar 4. 26 Safety Factor lengan cadik sudut rolling 3°

Pada rangka lengan cadik ini, nilai FOS terkecil adalah 1,4 pada lengan cadik dengan tebal 80 mm dengan profil T bar yang berarti rangka meja ini aman diberi beban statis. Sementara nilai FOS terbesar adalah 2,8 pada lengan cadik dengan tebal 120 mm dengan profil I bar yang berarti rangka meja ini aman diberi beban statis.

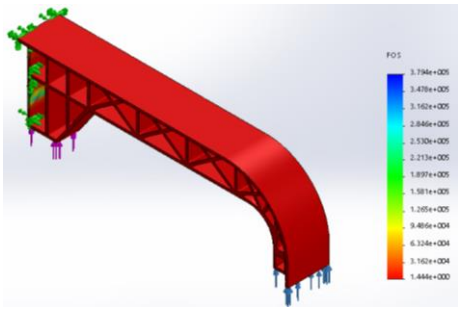
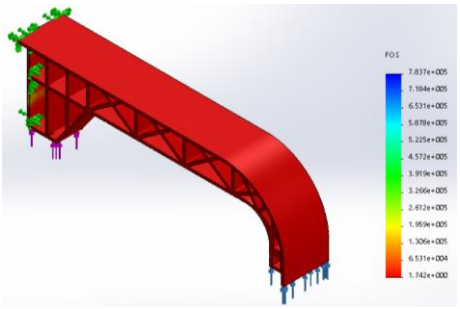
- Sudut Rolling 4



I bar 80 mm I bar 100 mm



I bar 120 mm T bar 80 mm

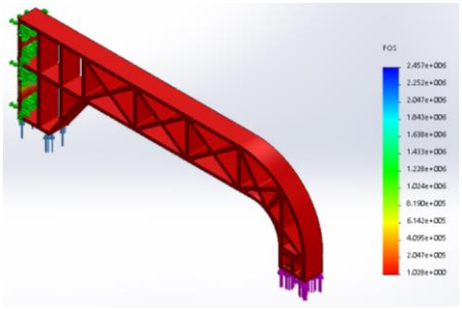
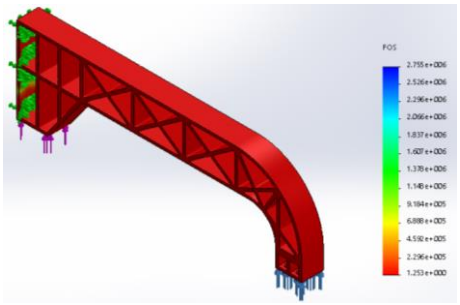



T bar 100 mm T bar 120 mm

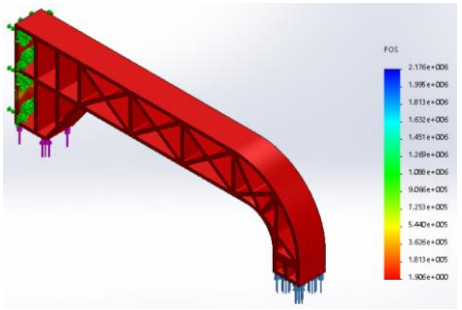
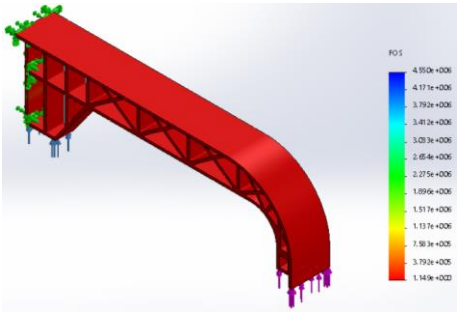
Gambar 4. 27 Safety Factor lengan cadik sudut rolling 4°

Pada rangka lengan cadik ini, nilai FOS terkecil adalah 1,2 pada lengan cadik dengan tebal 80 mm dengan profil T bar dan T bar yang berarti rangka meja ini aman diberi beban statis. Sementara nilai FOS terbesar adalah 2,3 pada lengan cadik dengan tebal 120 mm dengan profil I bar yang berarti rangka meja ini aman diberi beban statis.

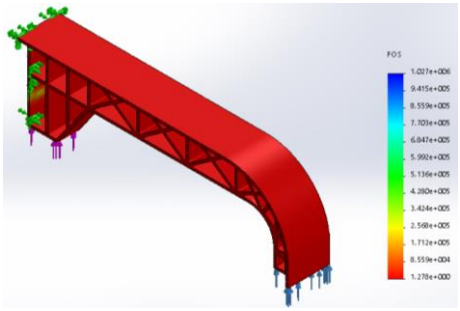
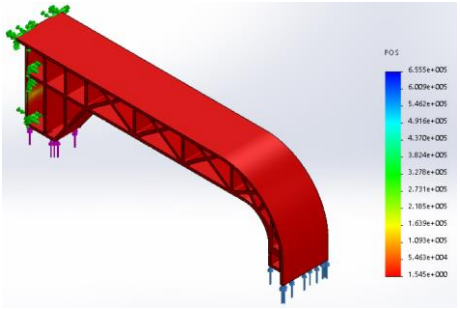
- Sudut Rolling 5

I bar 80 mm I bar 100 mm

I bar 120 mm T bar 80 mm

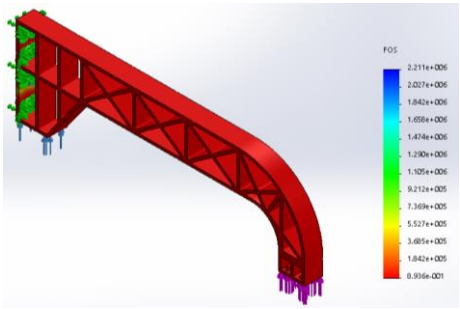
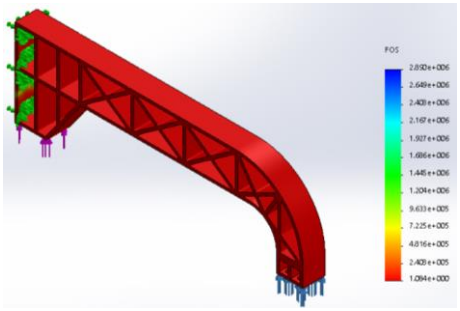



T bar 100 mm T bar 120 mm

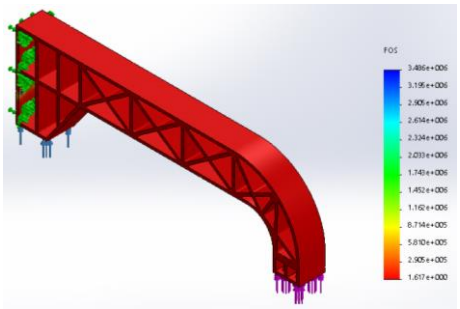
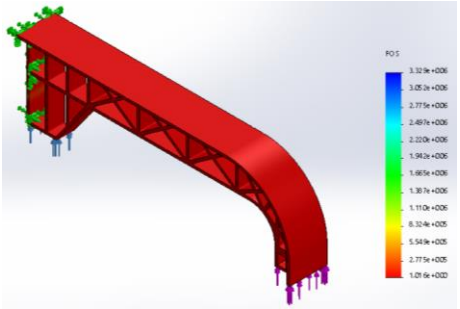
Gambar 4. 28 Safety Factor lengan cadik sudut rolling 5°

Pada rangka lengan cadik ini, nilai FOS terkecil adalah 1 pada lengan cadik dengan tebal 80 mm dengan profil T bar yang berarti rangka meja ini aman diberi beban statis. Sementara nilai FOS terbesar adalah 1,9 pada lengan cadik dengan tebal 120 mm dengan profil I bar yang berarti rangka meja ini aman diberi beban statis.

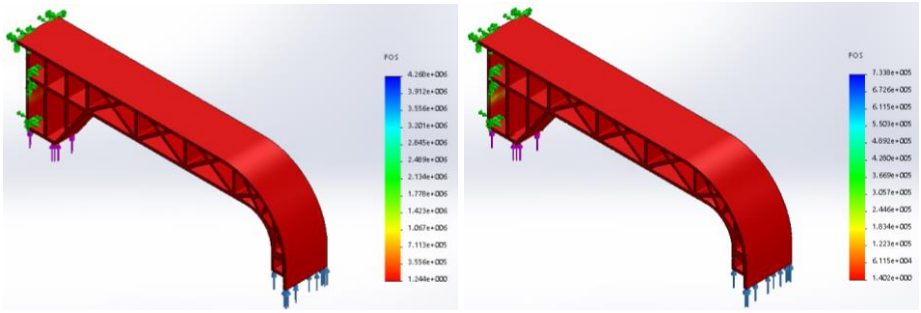
- Sudut Rolling 6

I bar 80 mm I bar 100 mm

I bar 120 mm T bar 80 mm



T bar 100 mm T bar 120 mm

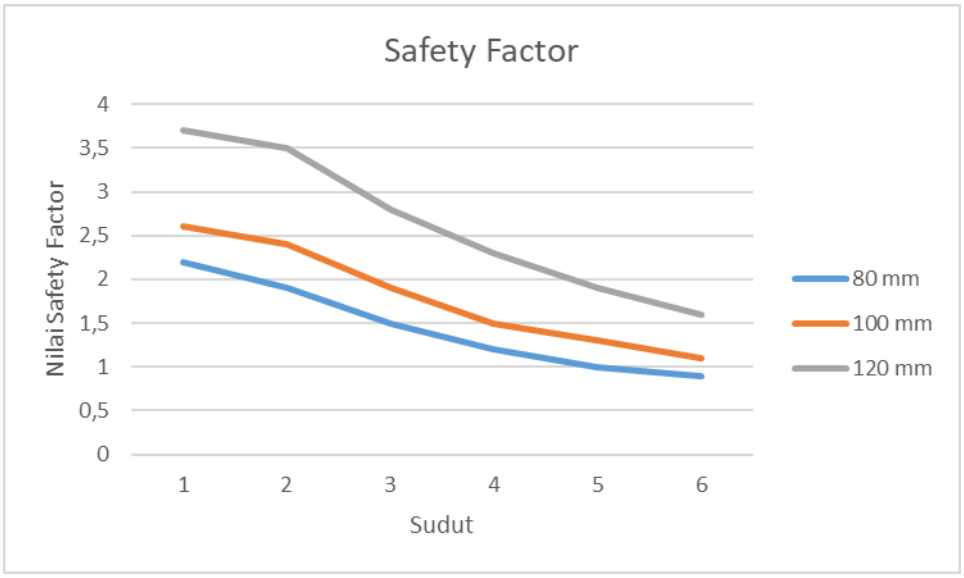
Gambar 4. 29 Safety Factor lengan cadik sudut rolling 6°

Pada rangka lengan cadik ini, nilai FOS terkecil adalah 0,89 pada lengan cadik dengan tebal 80 mm dengan profil I bar yang berarti rangka meja ini tidak aman diberi beban statis. Sementara nilai FOS terbesar adalah 1,6 pada lengan cadik dengan tebal 120 mm dengan profil I bar yang berarti rangka meja ini aman diberi beban statis.

Berikutnya nilai safety factor lengan cadik ditunjukkan dengan tabel dibawah ini.

Tabel 4. 6 Safety Factor I bar

HASIL PENGUJIAN I BAR			
Sudut	Tebal		
	80 mm	100 mm	120 mm
	Safety Factor		
1°	2,2	2,6	3,7
2°	1,9	2,4	3,5
3°	1,5	1,9	2,8
4°	1,2	1,5	2,3
5°	1	1,3	1,9
6°	0,89	1,1	1,6

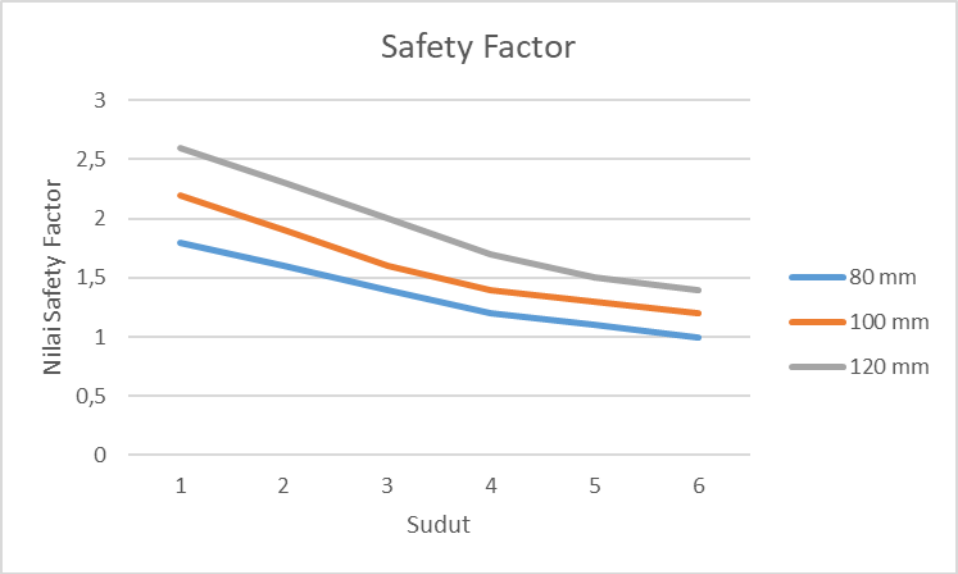


Gambar 4. 30 Safety Factor I bar

Dapat dilihat dari tabel dan grafik diatas bahwa semakin besat sudut kemiringan jukung maka safety factor semakin mengecil. Dan nilai terkecil terjadi pada lengan cadik dengan tebal 80 mm yaitu sebesar 0,89. Nilai lengan cadik ini dibawah 1 yang berarti bahwa lengan cadik ini tidak baik untuk digunakan. Lain halnya dengan profil tebal 100 mm dan 120 mm, memiliki nilai diatas 1 yang berarti bahwa layak untuk digunakan.

Tabel 4. 7 Safety Factor T bar

HASIL PENGUJIAN T BAR			
Sudut	Tebal		
	80 mm	100 mm	120 mm
	Safety Factor		
1°	1,8	2,2	2,6
2°	1,6	1,9	2,3
3°	1,4	1,6	2
4°	1,2	1,4	1,7
5°	1,1	1,3	1,5
6°	1	1,2	1,4



Gambar 4. 31 Safety Factor T bar

Dapat dilihat dari tabel dan grafik diatas bahwa semakin besat sudut kemiringan jukung maka safety factor semakin mengecil. Dan nilai terkecil terjadi pada lengan cadik dengan tebal 80 mm yaitu sebesar 1. Dilihat dari tabel diatas menandakan bahwa profil T bar dapat digunakan mulai dari tebal profil 80 mm – 120 mm.

“halaman ini sengaja dikosongkan”

BAB V
KESIMPULAN

Dari beberapa simulasi yang telah dilakukan dengan beberapa variasi tebal profil, sudut kemiringan jukung, dan jenis profil, dapat ditarik beberapa kesimpulan antara lain :

1. Minimal dimensi lengan cadik yang diperlukan oleh jukung adalah 80 mm dengan profil T bar. Hal ini dapat dapat diketahui setelah melihat safety factor hasil percobaan karena berada diatas nilai satu pada sudut rolling 1°- 6°.
2. Beban yang dapat diterima lengan cadik dengan lebar 80 mm dan profil T bar adalh sebesar 29,1 N/m^2.
3. Bentuk detal kontruksi yang cocok untuk jukung adalah profil I bar. Sebab memiliki nilai safety factor yang relatif besar dan dan aman untuk digunakan. Untuk memenuhi safety factor 2 sesuai permintaan owner, maka profil yang lengan cadik yang yang terbaik adalah adalah tebal 120 mm dengan profil I bar dan mampu menerima rolling maximum 4,75°.

Adapun kesimpulan lain yang diperoleh dari hasil percobaan adalah sebagai berikut :

1. Profil I bar dengan tebal 80 mm tidak dapat digunakan sebagi lengan cadik karena memiliki nilai strees lebih besar dari nilai yield dan memiliki nilai safety factor dibawah 1.
2. Profil I bar dengan tebal 100 mm dan 120 mm dapat digunakan sebagai lengan cadik sebab memiliki nilai stress dibawah nilai yield dan safety factor diatas 1.
3. Profil T bar dapat digunakan sebagai lengan cadik dengan tebal 80 mm – 120 mm.

“halaman ini sengaja dikosongkan”

DAFTAR PUSTAKA

Harringtom, Roy L, 1971. *Marine Engineering*. New York : The Society of Naval Architects and Marine Engineers.

Marley.2010.*HDPE Physical Properties*. Johannesburg : Marley Pipe System.

“halaman ini sengaja dikosongkan”

BIODATA MAHASISWA

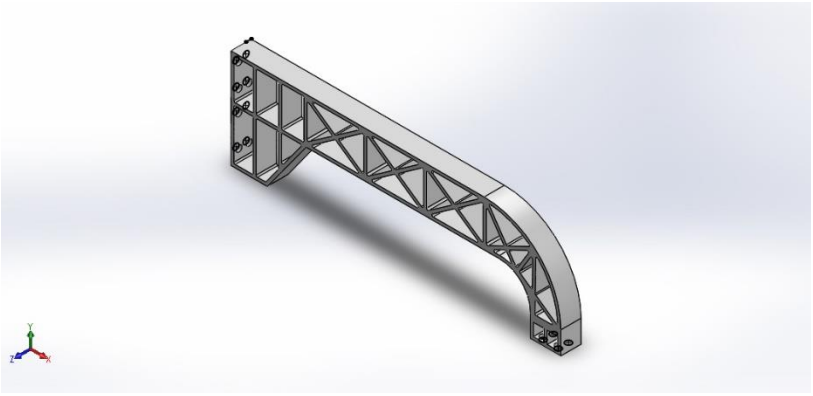
Nama penulis skripsi ini Salman Farizy. Penulis lahir dari dua orang tua bapak Kun Pratomo dan Ibu Siti Maryam sebagai anak kedua dari dua bersaudara. Penulis dilahirkan dikota Balikpapan pada tanggal 10 Februari 1994. Penulis menempuh pendidikan SD di SDN 036 Balikpapan saat kelas 1, kemudian pindah ke SDN 018 Balikpapan saat pertengahan masa sekolah, melanjutkan sekolah ke SMP Negeri 7 Balikpapan, dan SMK Negeri 1 Balikpapan. Hingga akhirnya bisa menempuh masa kuliah di Intitut Teknologi Sepuluh Nopember di Surabaya.

Penulis juga aktif di kegiatan organisasi kampus. Organisasi yang pernah penulis ikuti ialah Badan Eksekutif Mahasiswa (BEM) menjabat sebagai staf Pengenbangan Sumber Daya Mahasiswa (PSDM) dan Himpunan Mahasiswa Jurusan (HMJ) menjabat sebagai Ketua Divisi PSDM.

Hingga kini penulis aktif membantu kegiatan keagamaan di Majelis Rasulullah SAW Jawa Timur pimpinan Al Habib Idrus bin Muhammad Al Aydrus sebagai Ketua Divisi Usaha (Koperasi Majelis).

Dengan ketekunan, motivasi dari berbagai pihak, penulis telah berhasil menyelesaikan pengerjaan tugas akhir skripsi ini. Semoga dalam penulisan tugas akhir skripsi ini mampu memberikan konstribusi positif bagi dunia maritim.

“halaman ini sengaja dikosongkan”



Simulation of Lengan Cadik (80 mm)

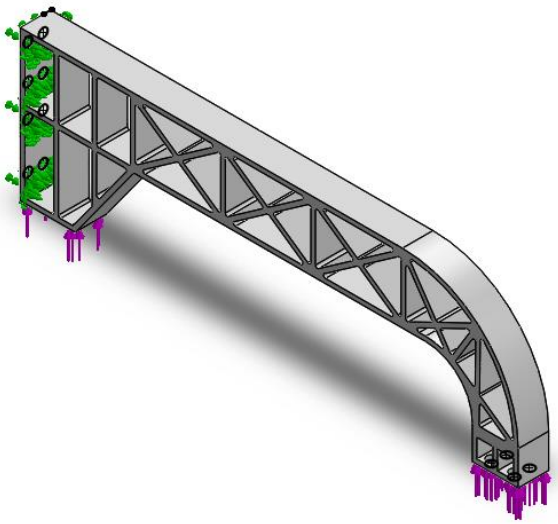
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 133
Analysis type: Static

Table of Contents

Description

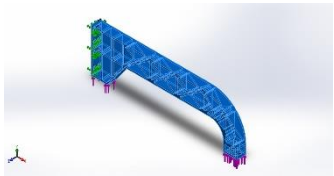
No Data

Model Information



Model name: Lengan Cadik (80 mm)
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude4 	Solid Body	**Mass:7.12664 kg** **Volume:0.00748597 m^3** **Density:952 kg/m^3** **Weight:69.8411 N**	**E:\Kuliah\SolidWorks\Ibar\SolidWork\Lengan Cadik (80 mm).SLDPRT** Jul 09 09:01:44 2018

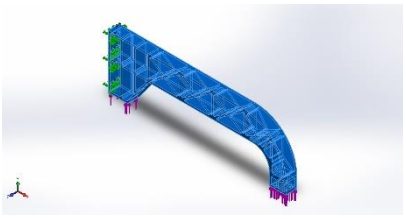
Study Properties

Study name	133
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	On
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\I bar\SolidWork)

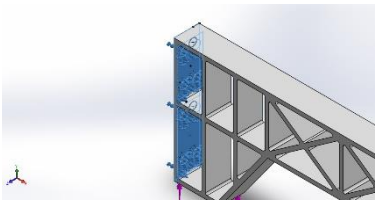
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

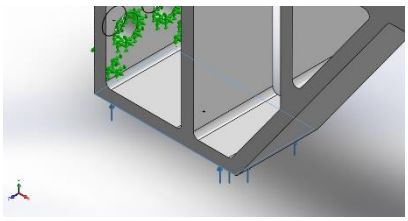
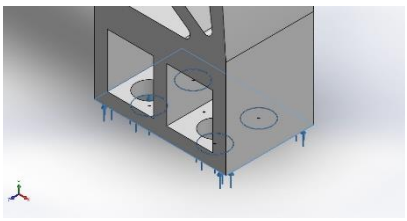
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude4)(Lengan Cadik (80 mm))
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	0.094515	-2383.85	-0.0528096	2383.85
Reaction Moment(N.m)	0	0	0	0

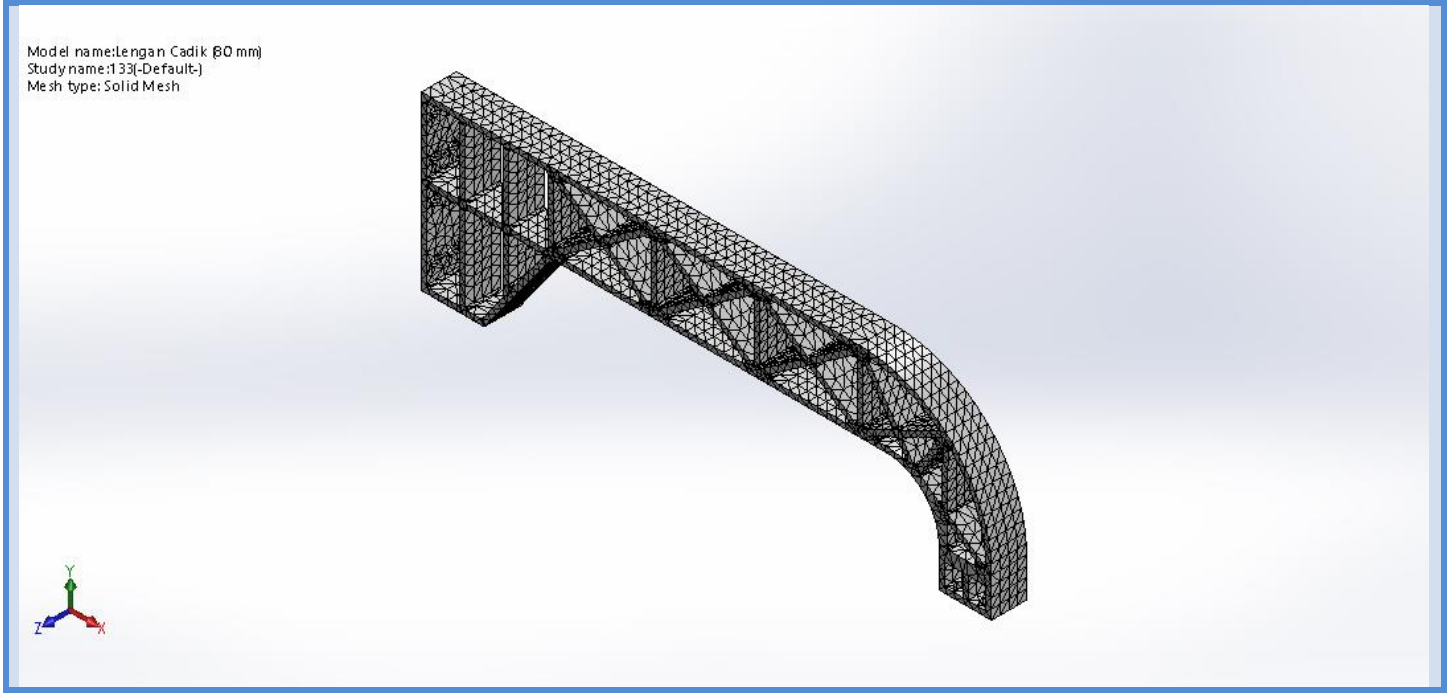
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 133.55 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	22.458 mm
Tolerance	1.1229 mm
Mesh Quality Plot	High

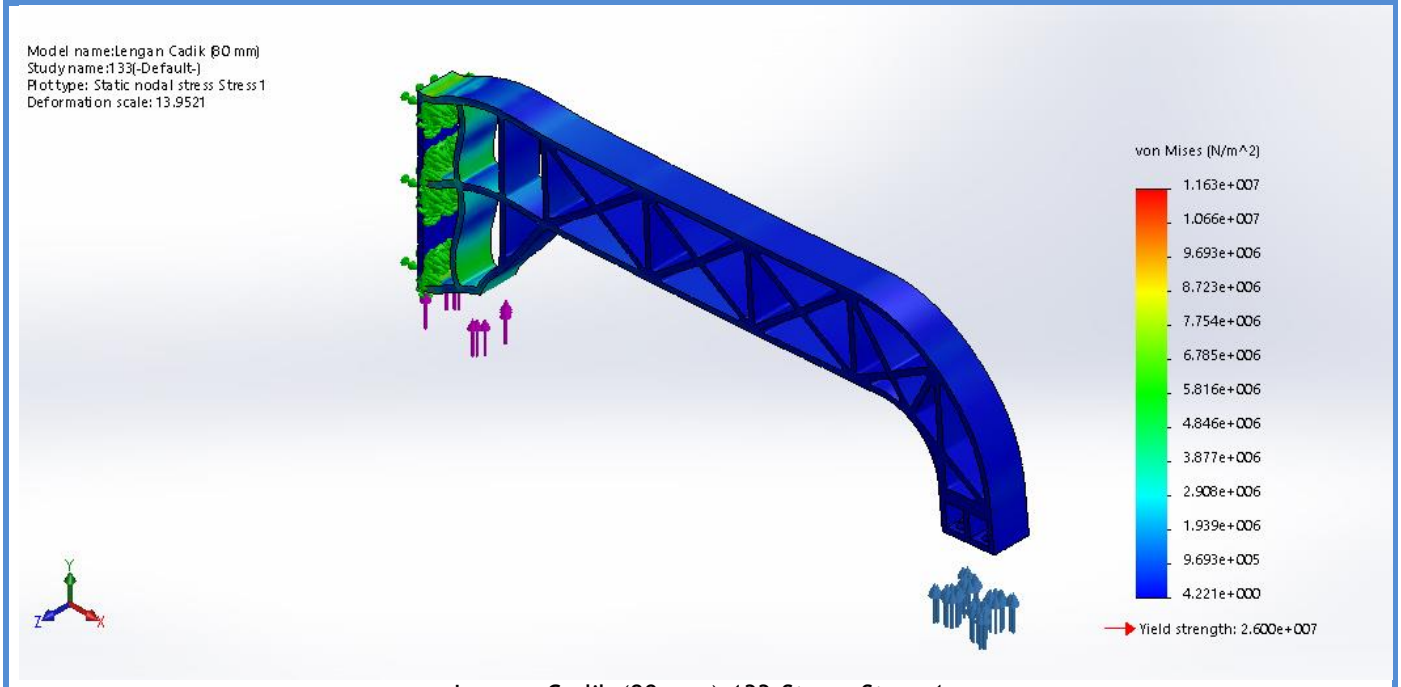
Mesh information - Details

Total Nodes	26674
Total Elements	13094
Maximum Aspect Ratio	17.716
% of elements with Aspect Ratio < 3	75.7
% of elements with Aspect Ratio > 10	0.389
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:05
Computer name:	



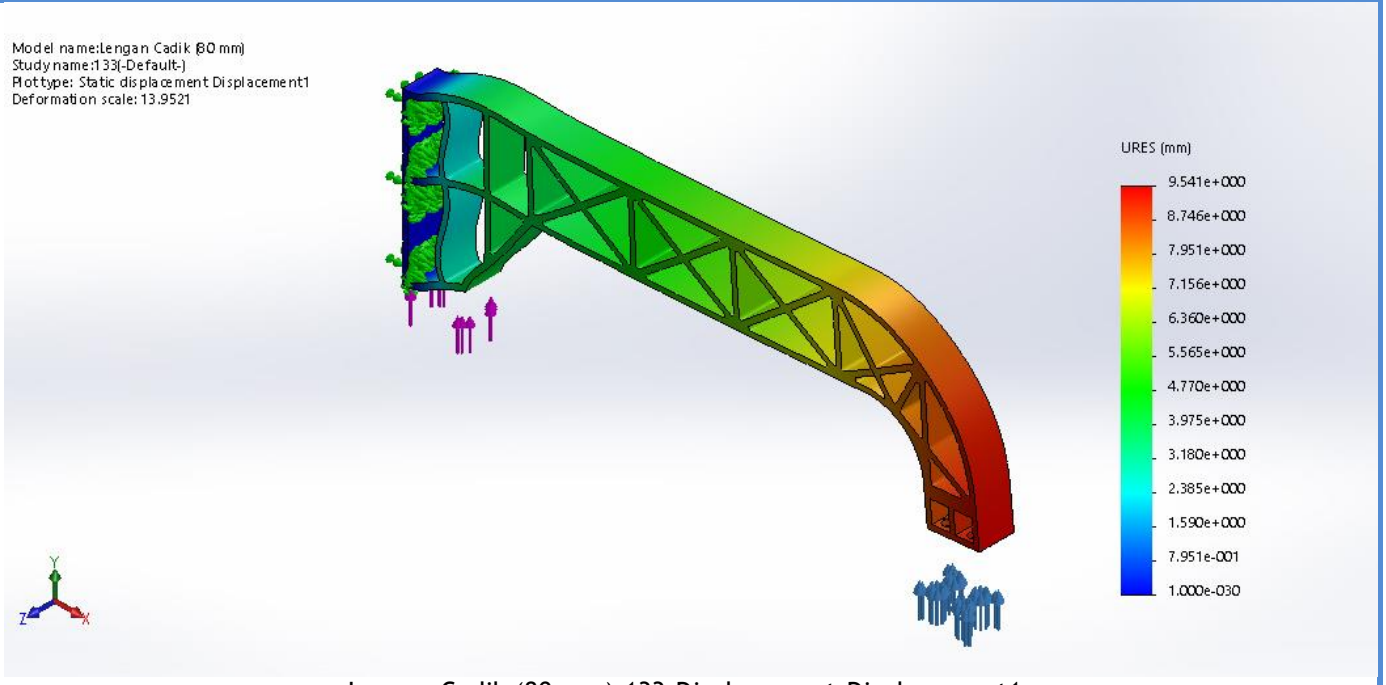
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	4.221e+000N/m^2 Node: 1741	1.163e+007N/m^2 Node: 16612



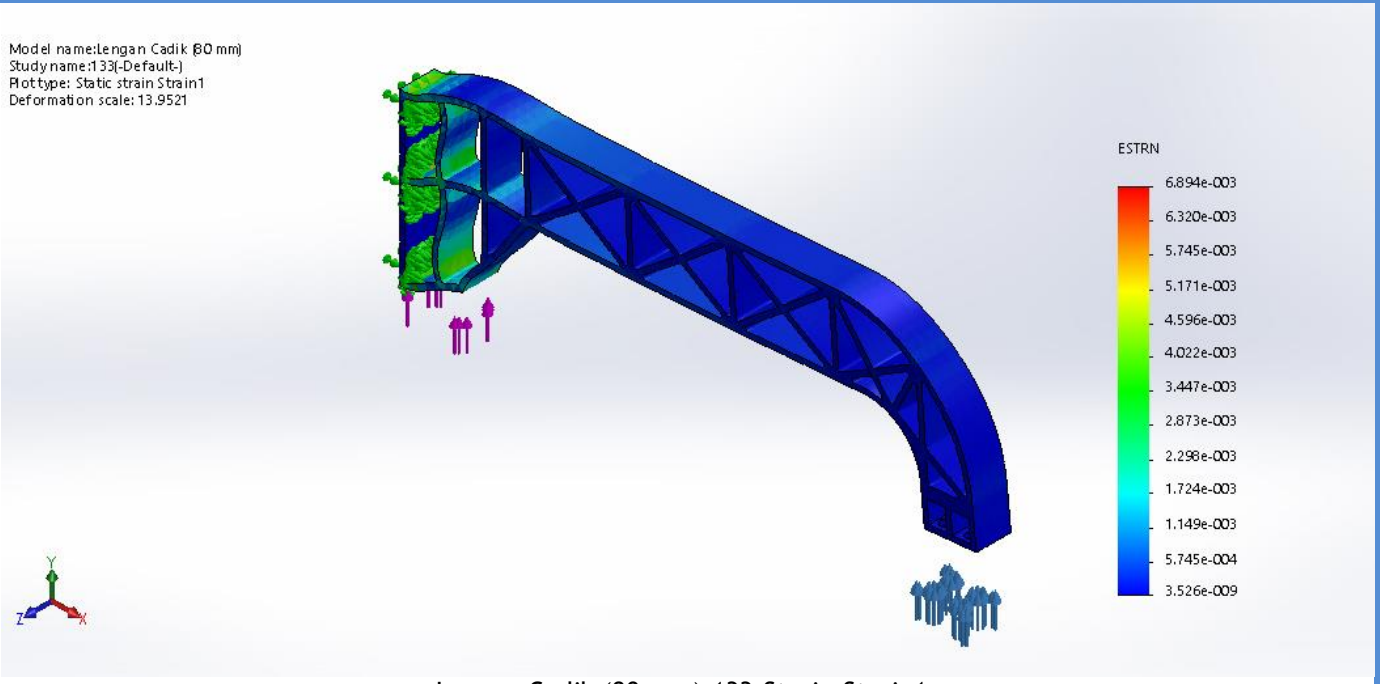
Lengan Cadik (80 mm)-133-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	9.541e+000mm Node: 16009



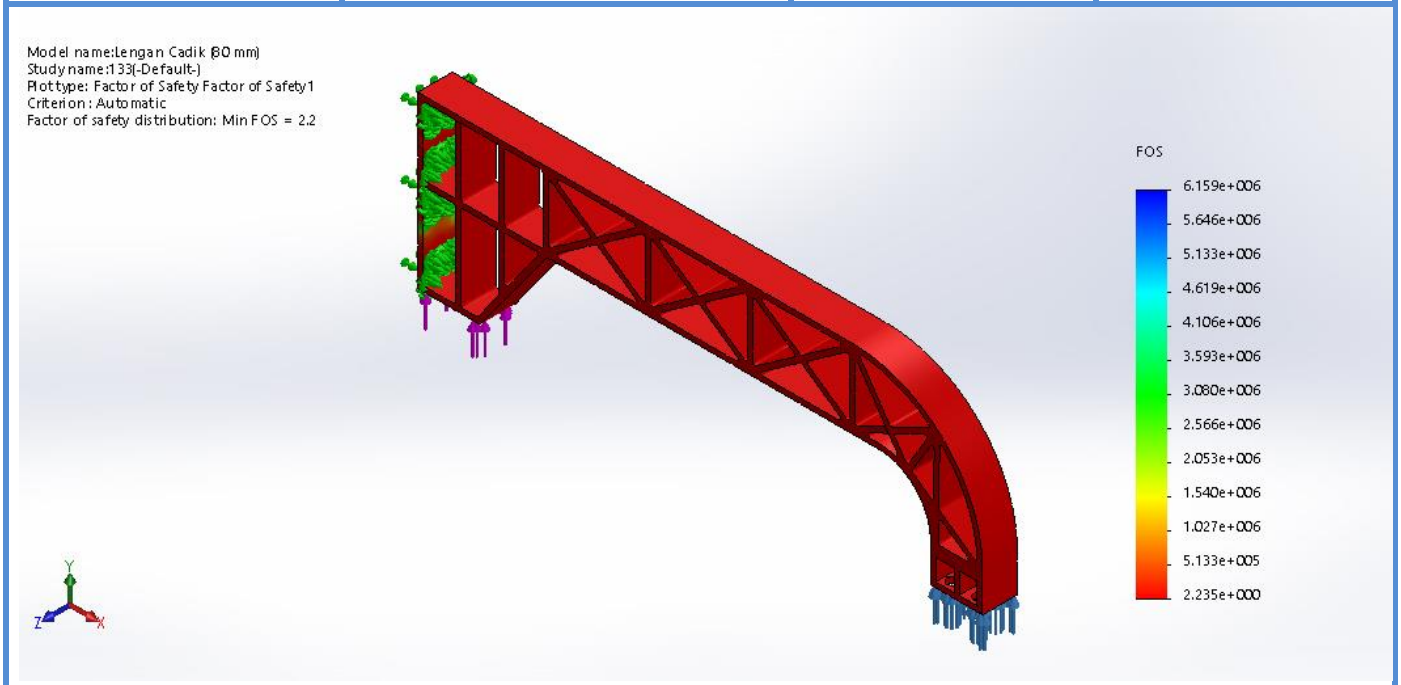
Lengan Cadik (80 mm)-133-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	3.526e-009 Element: 7150	6.894e-003 Element: 7924

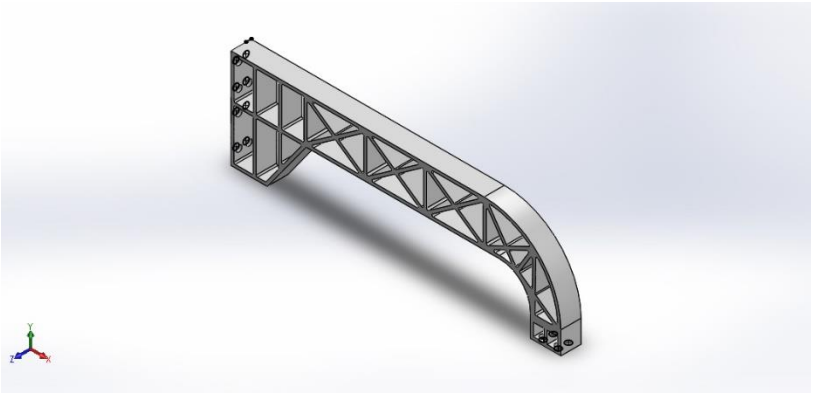


Lengan Cadik (80 mm)-133-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	2.235e+000 Node: 16612	6.159e+006 Node: 1741



Lengan Cadik (80 mm)-133-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (80 mm)

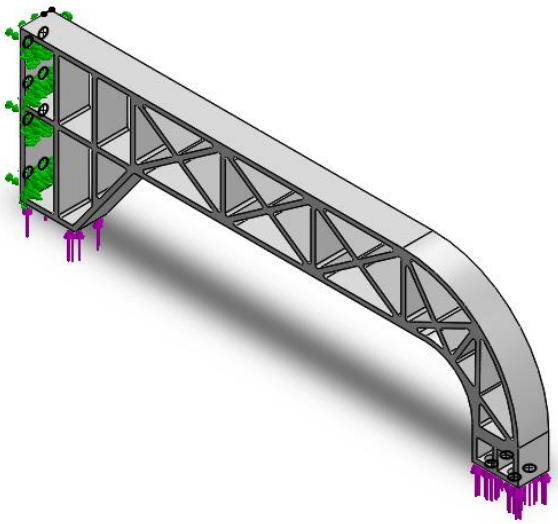
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 361
Analysis type: Static

Table of Contents

Description

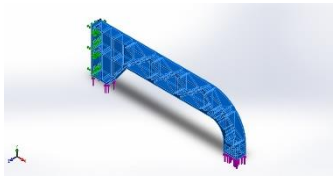
No Data

Model Information



Model name: Lengan Cadik (80 mm)
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude4 	Solid Body	**Mass:7.12664 kg** **Volume:0.00748597 m^3** **Density:952 kg/m^3** **Weight:69.8411 N**	**E:\Kuliah\SolidWorks\Ibar\SolidWork\Lengan Cadik (80 mm).SLDPRT** Jul 09 09:01:44 2018

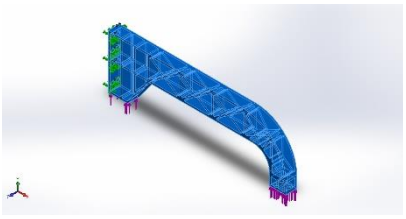
Study Properties

Study name	361
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\I bar\SolidWork)

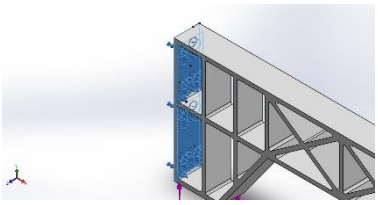
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

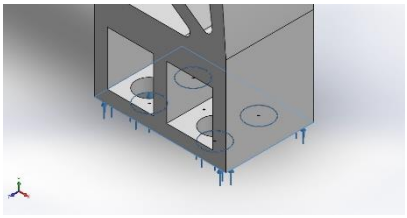
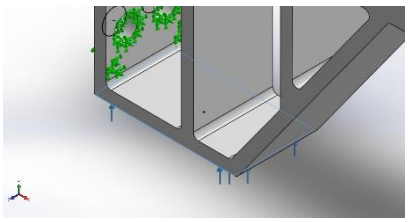
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude4)(Lengan Cadik (80 mm))
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-4.21709	-2611.73	0.675751	2611.73
Reaction Moment(N.m)	0	0	0	0

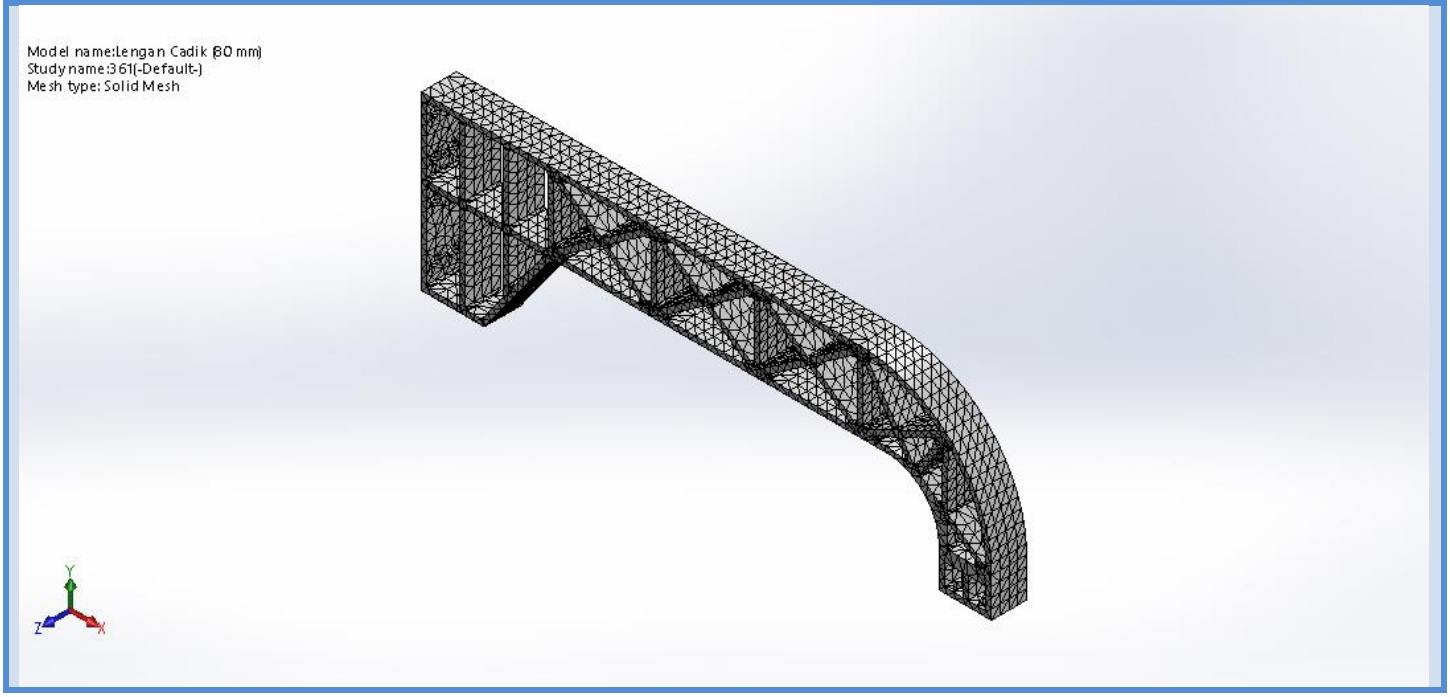
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 361.76 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	22.458 mm
Tolerance	1.1229 mm
Mesh Quality Plot	High

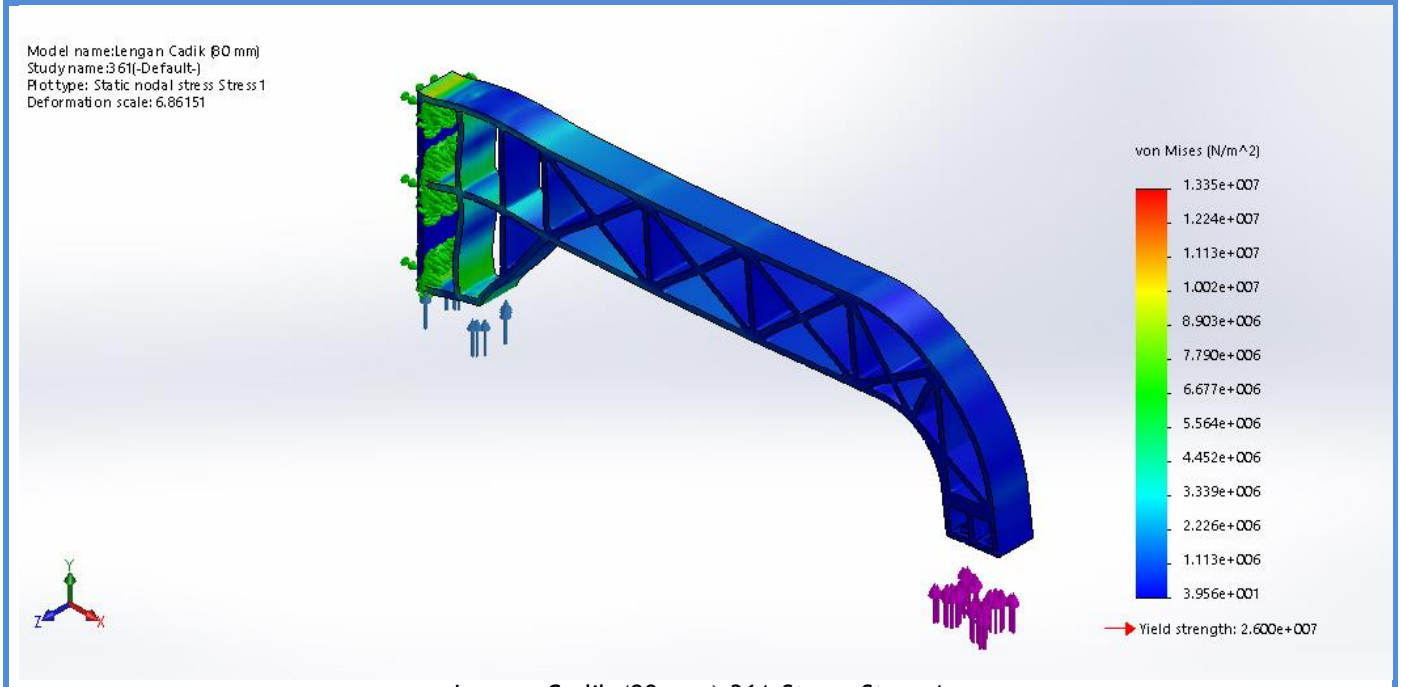
Mesh information - Details

Total Nodes	26674
Total Elements	13094
Maximum Aspect Ratio	17.716
% of elements with Aspect Ratio < 3	75.7
% of elements with Aspect Ratio > 10	0.389
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:03
Computer name:	



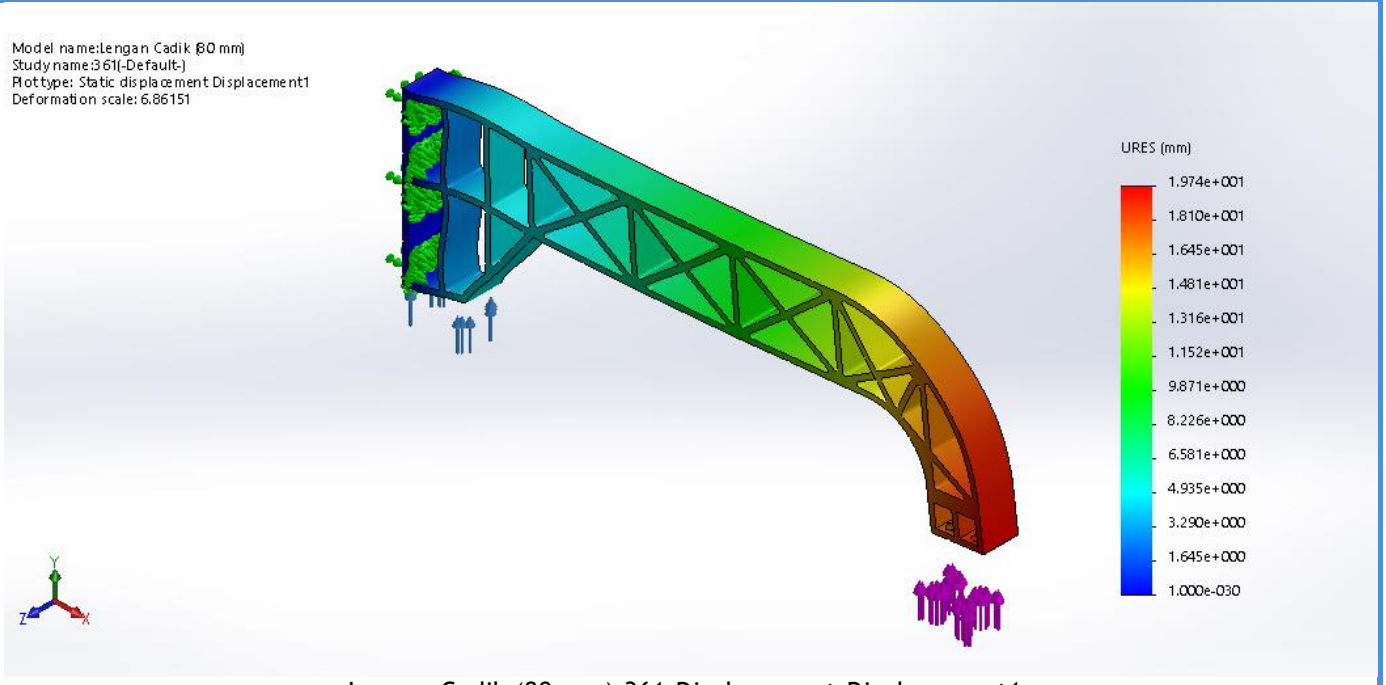
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	3.956e+001N/m^2 Node: 13437	1.335e+007N/m^2 Node: 21139



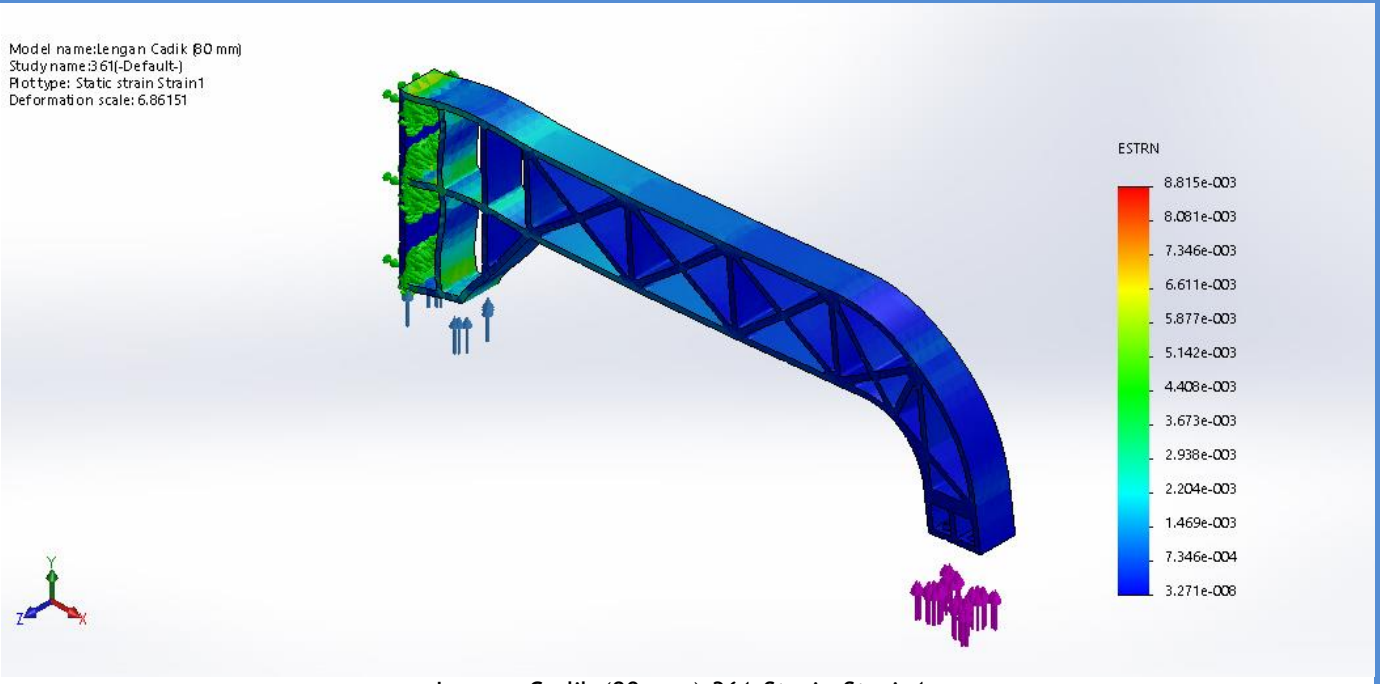
Lengan Cadik (80 mm)-361-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	1.974e+001mm Node: 16009



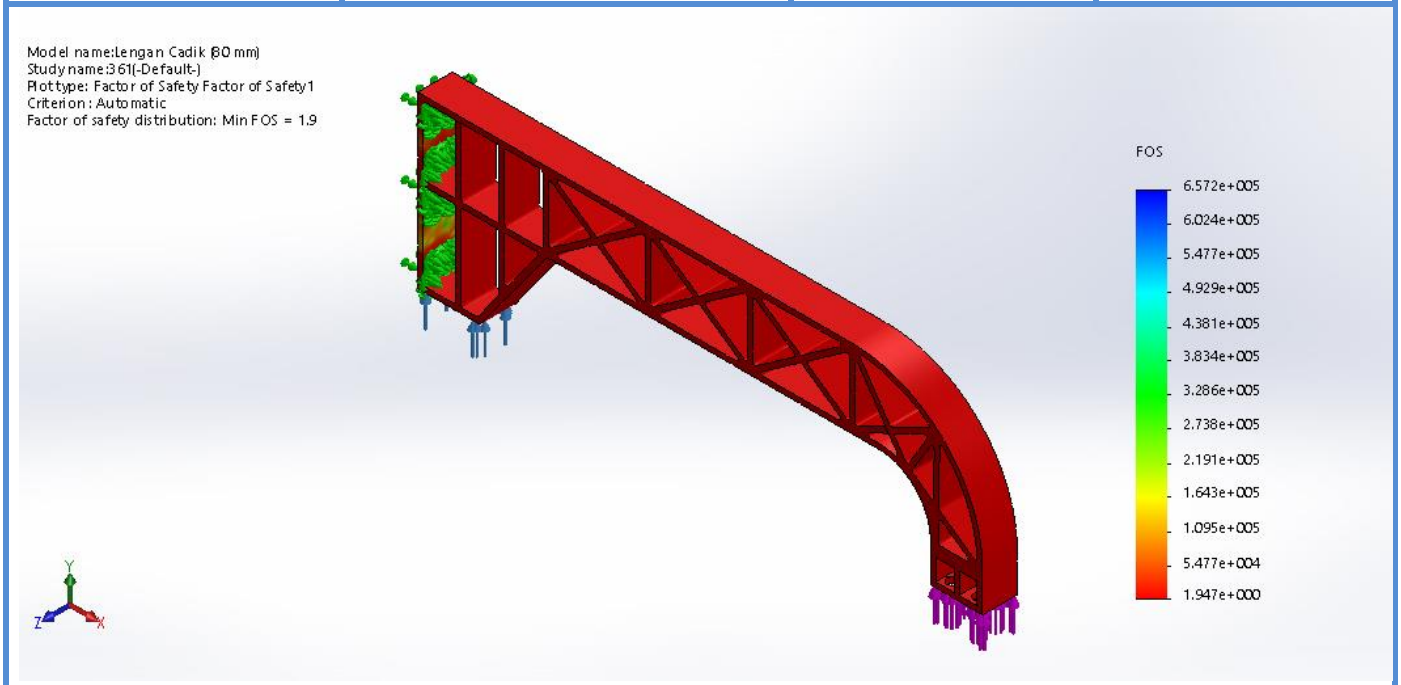
Lengan Cadik (80 mm)-361-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	3.271e-008 Element: 7158	8.815e-003 Element: 652

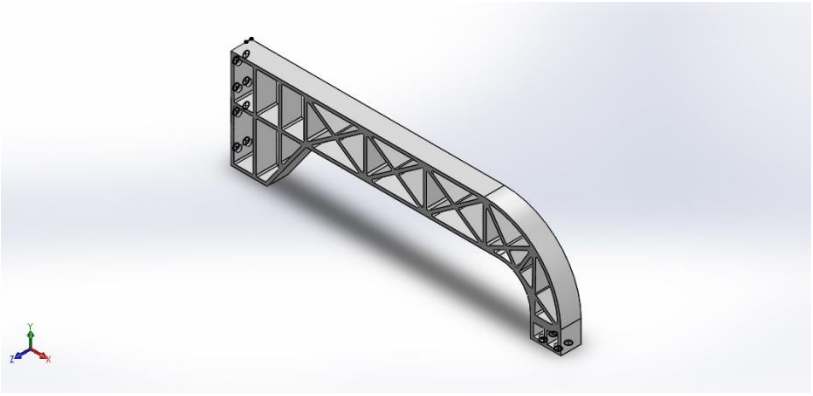


Lengan Cadik (80 mm)-361-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.947e+000 Node: 21139	6.572e+005 Node: 13437



Lengan Cadik (80 mm)-361-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (80 mm)

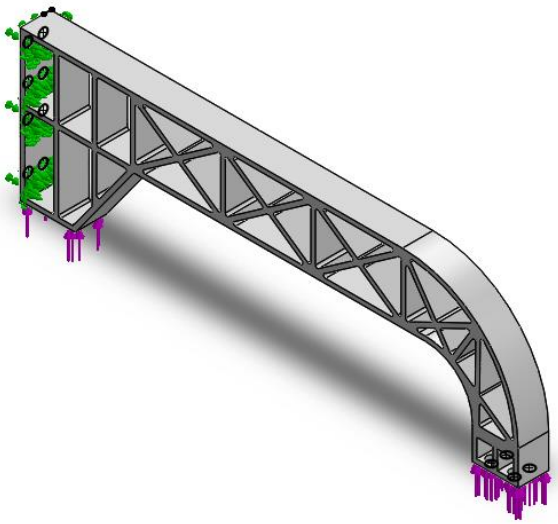
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 633
Analysis type: Static

Table of Contents

Description

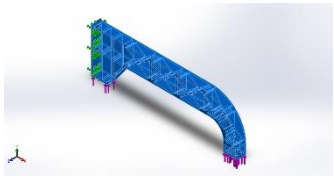
No Data

Model Information



Model name: Lengan Cadik (80 mm)
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude4 	Solid Body	**Mass:7.12664 kg** **Volume:0.00748597 m^3** **Density:952 kg/m^3** **Weight:69.8411 N**	**E:\Kuliah\SolidWorks\Ibar\SolidWork\Lengan Cadik (80 mm).SLDPRT** Jul 09 09:01:44 2018

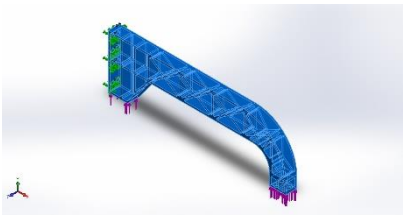
Study Properties

Study name	633
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\I bar\SolidWork)

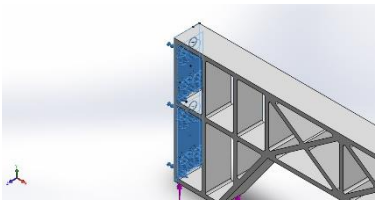
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

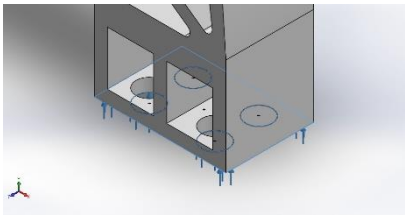
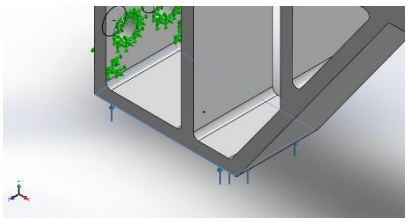
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude4)(Lengan Cadik (80 mm))
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-4.26327	-2882.58	0.157954	2882.58
Reaction Moment(N.m)	0	0	0	0

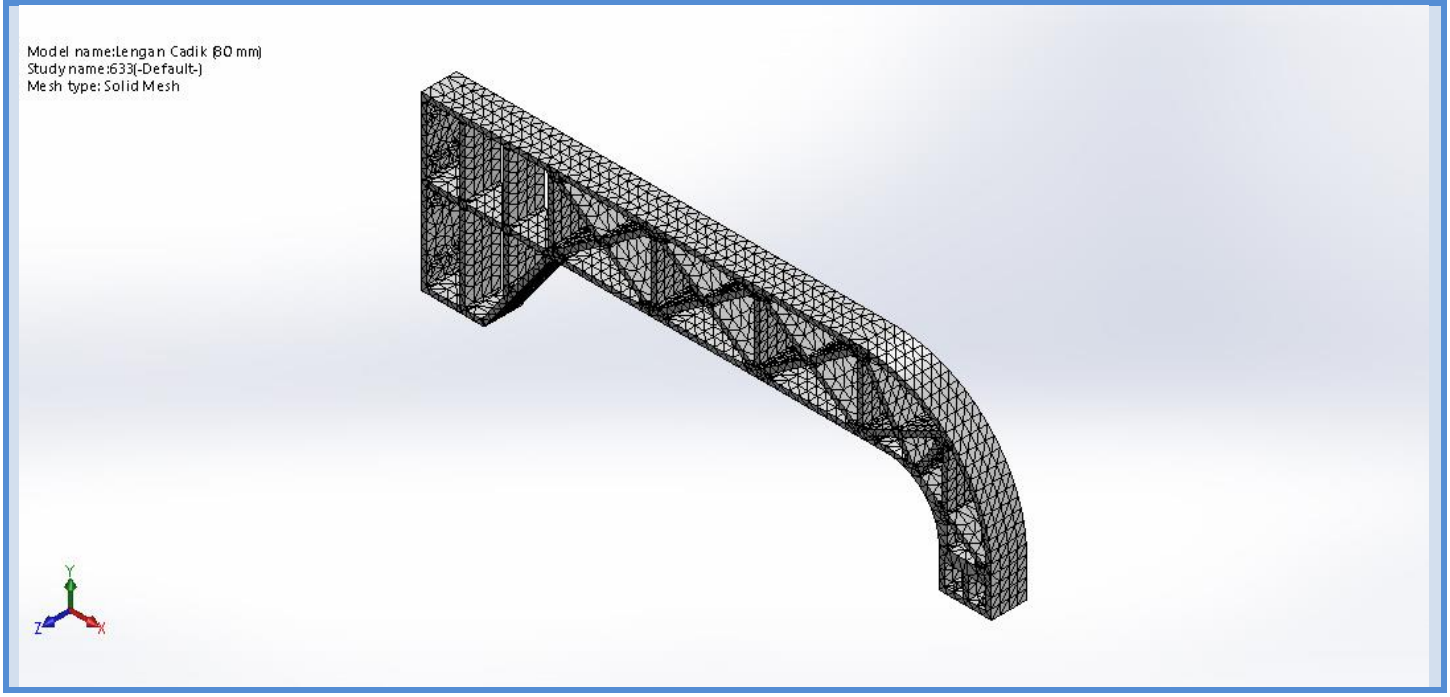
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 633.36 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	22.458 mm
Tolerance	1.1229 mm
Mesh Quality Plot	High

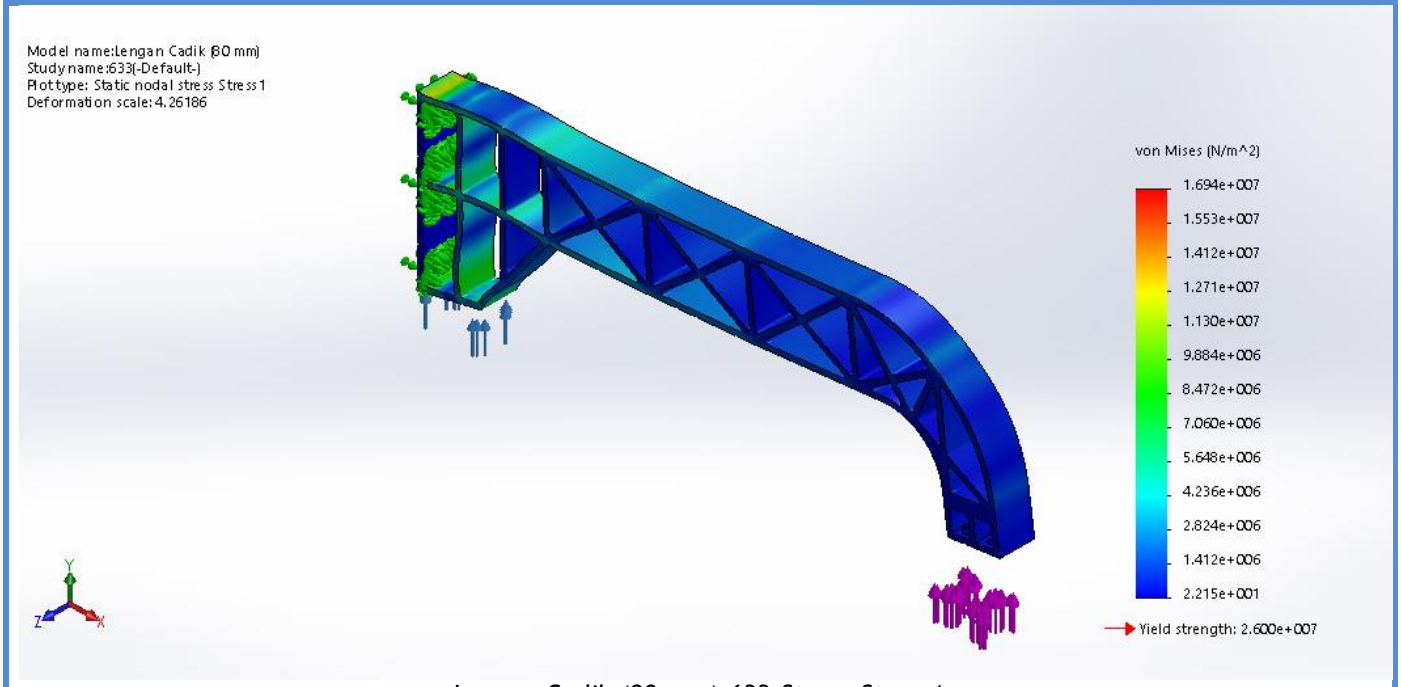
Mesh information - Details

Total Nodes	26674
Total Elements	13094
Maximum Aspect Ratio	17.716
% of elements with Aspect Ratio < 3	75.7
% of elements with Aspect Ratio > 10	0.389
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



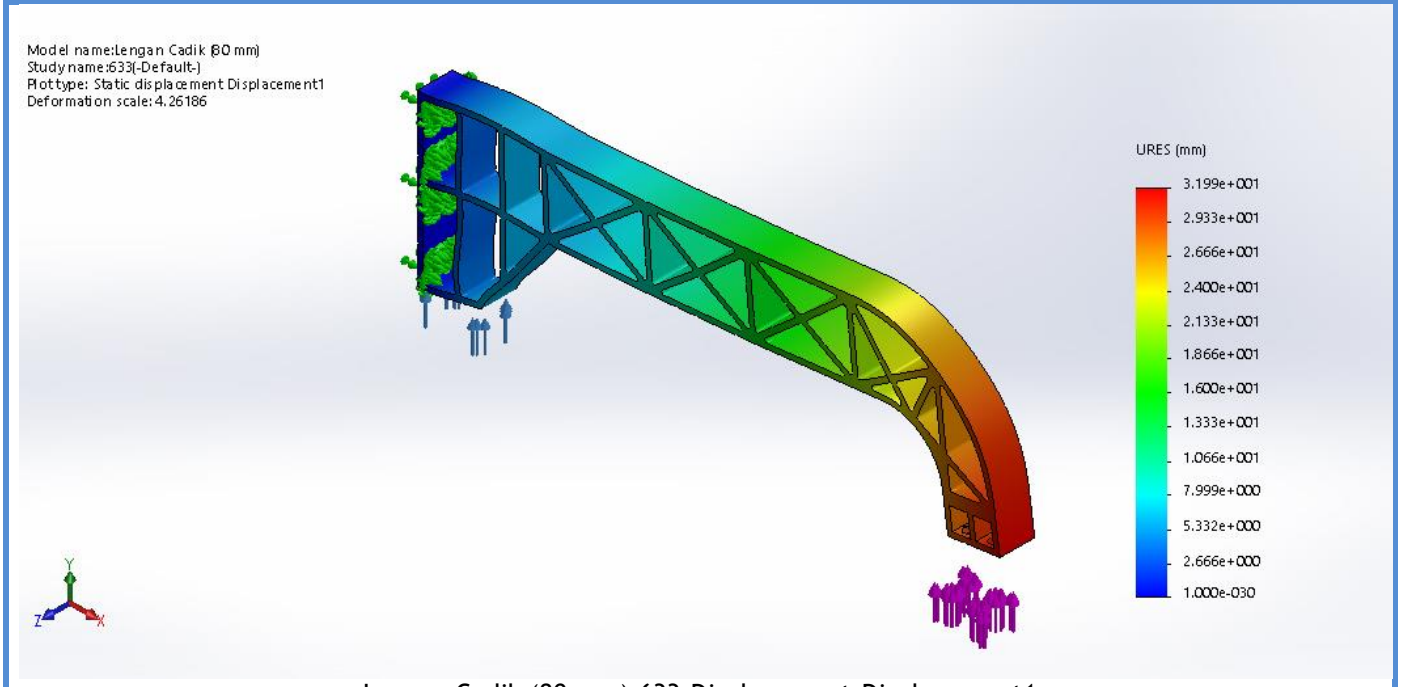
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	2.215e+001N/m^2 Node: 10341	1.694e+007N/m^2 Node: 21139



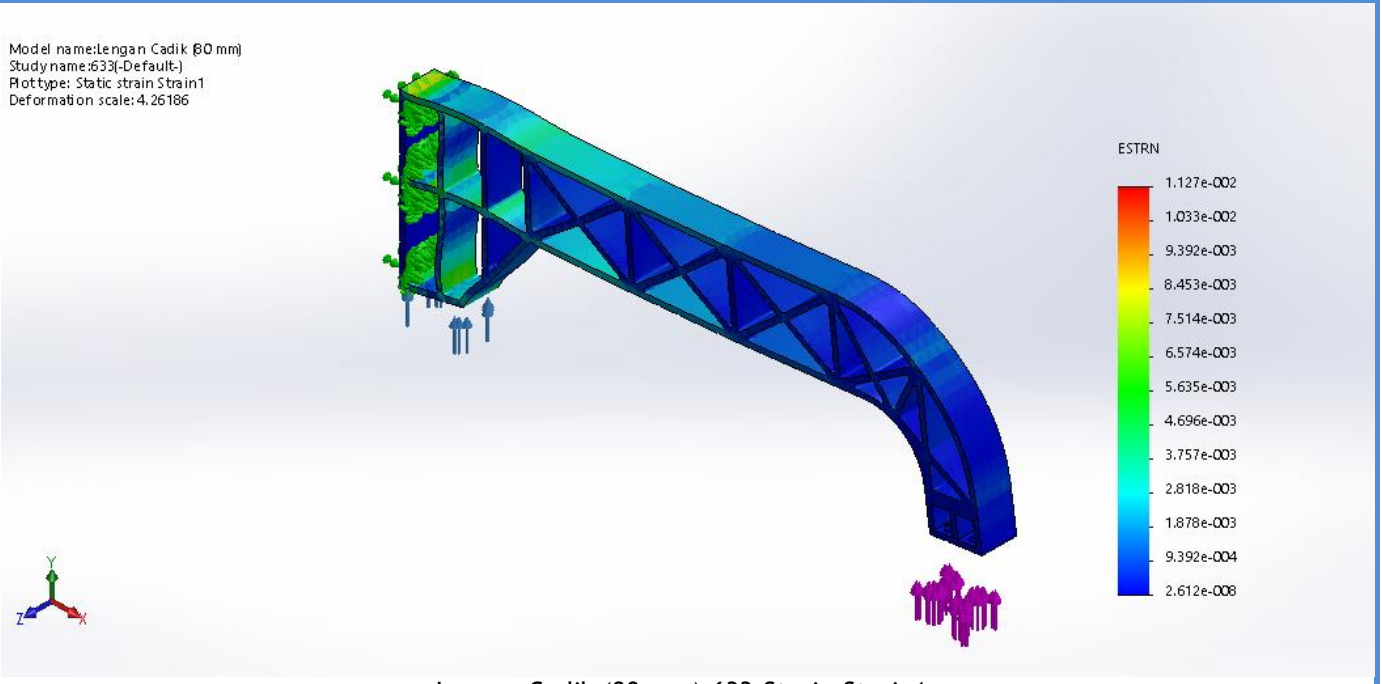
Lengan Cadik (80 mm)-633-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	3.199e+001mm Node: 16009



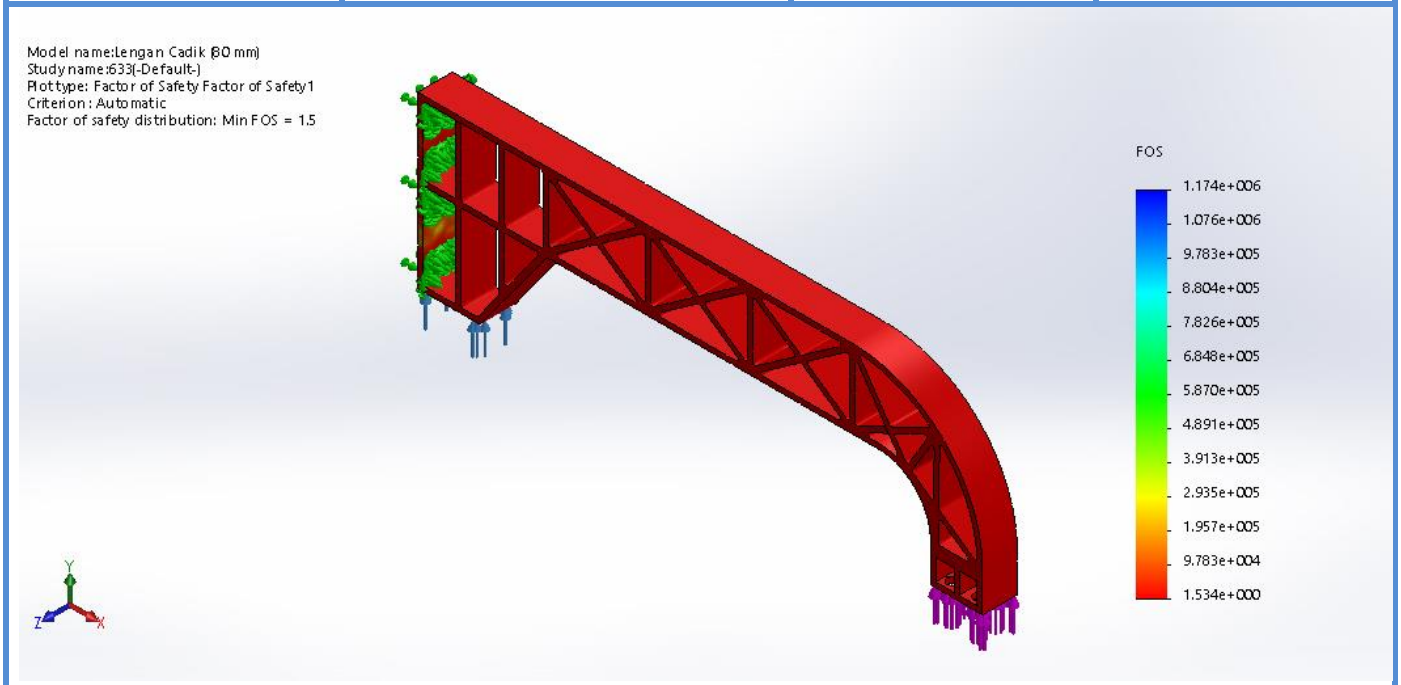
Lengan Cadik (80 mm)-633-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	2.612e-008 Element: 6488	1.127e-002 Element: 652

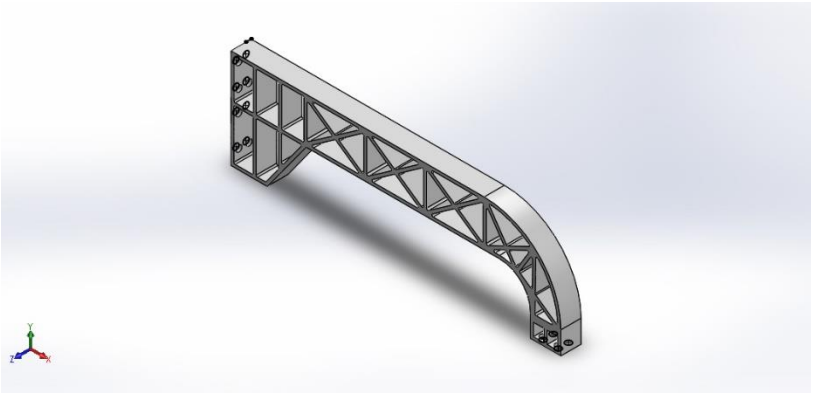


Lengan Cadik (80 mm)-633-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.534e+000 Node: 21139	1.174e+006 Node: 10341



Lengan Cadik (80 mm)-633-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (80 mm)

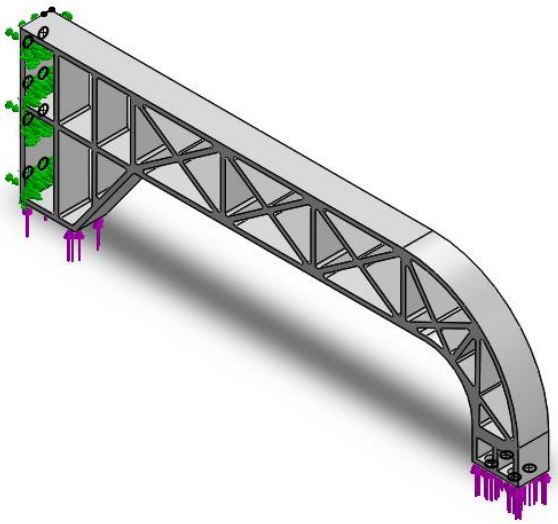
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 916
Analysis type: Static

Table of Contents

Description

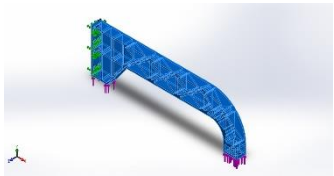
No Data

Model Information



Model name: Lengan Cadik (80 mm)
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude4 	Solid Body	**Mass:7.12664 kg** **Volume:0.00748597 m^3** **Density:952 kg/m^3** **Weight:69.8411 N**	**E:\Kuliah\SolidWorks\Ibar\SolidWork\Lengan Cadik (80 mm).SLDPRT** Jul 09 09:01:44 2018

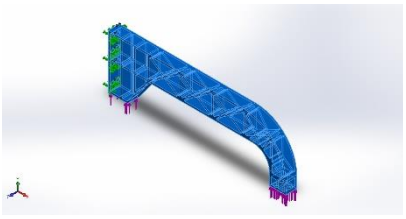
Study Properties

Study name	916
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	On
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\I bar\SolidWork)

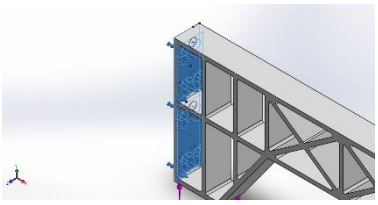
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

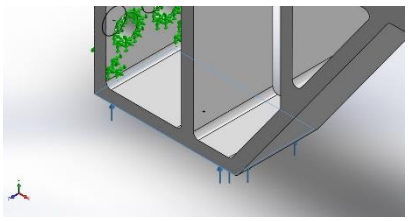
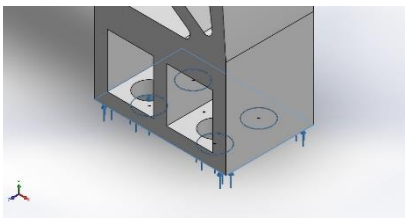
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude4)(Lengan Cadik (80 mm))
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	0.0629627	-3166.58	-0.142106	3166.58
Reaction Moment(N.m)	0	0	0	0

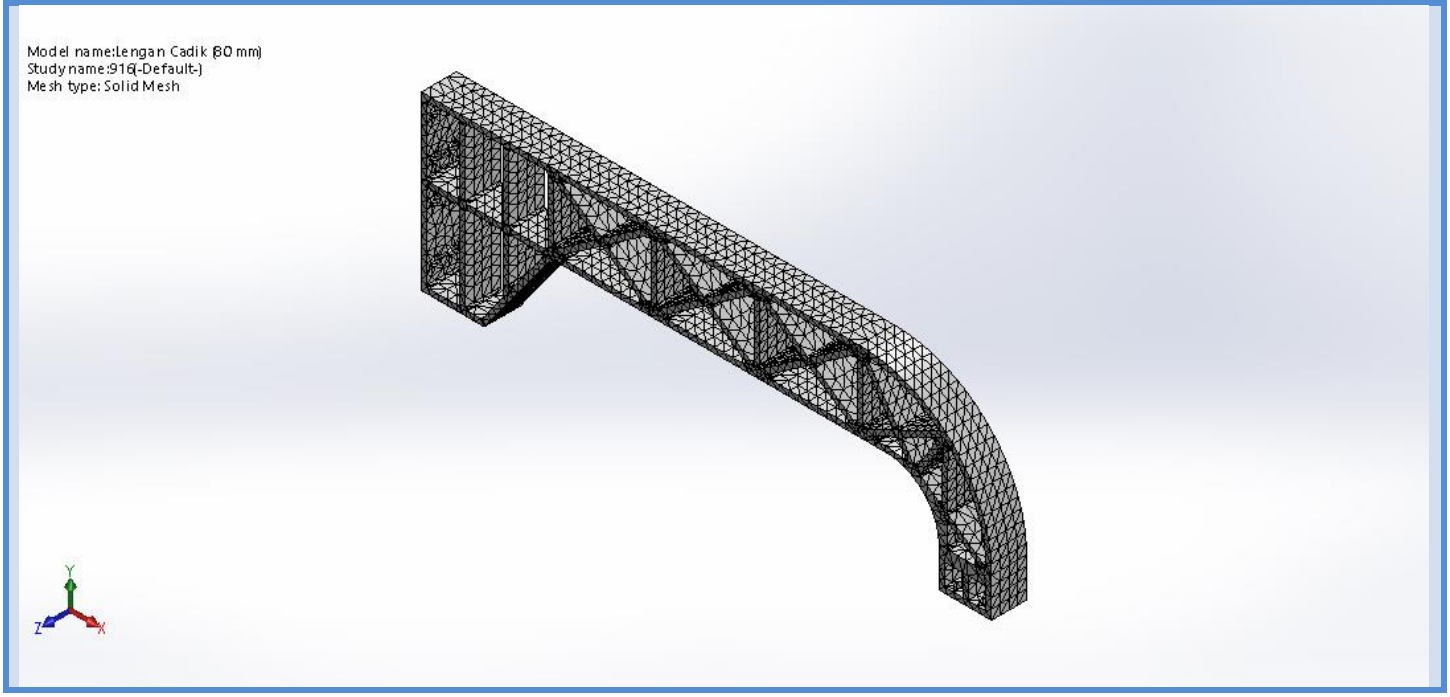
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 916.04 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	22.458 mm
Tolerance	1.1229 mm
Mesh Quality Plot	High

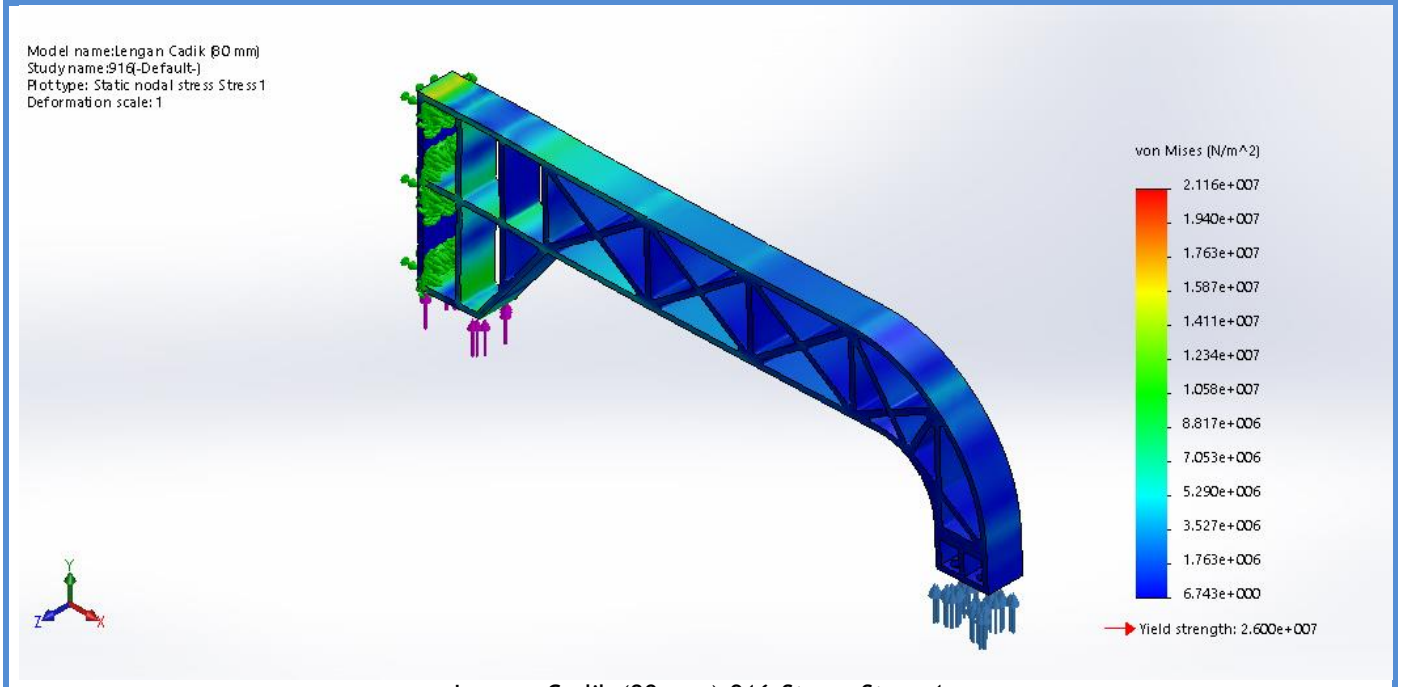
Mesh information - Details

Total Nodes	26674
Total Elements	13094
Maximum Aspect Ratio	17.716
% of elements with Aspect Ratio < 3	75.7
% of elements with Aspect Ratio > 10	0.389
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



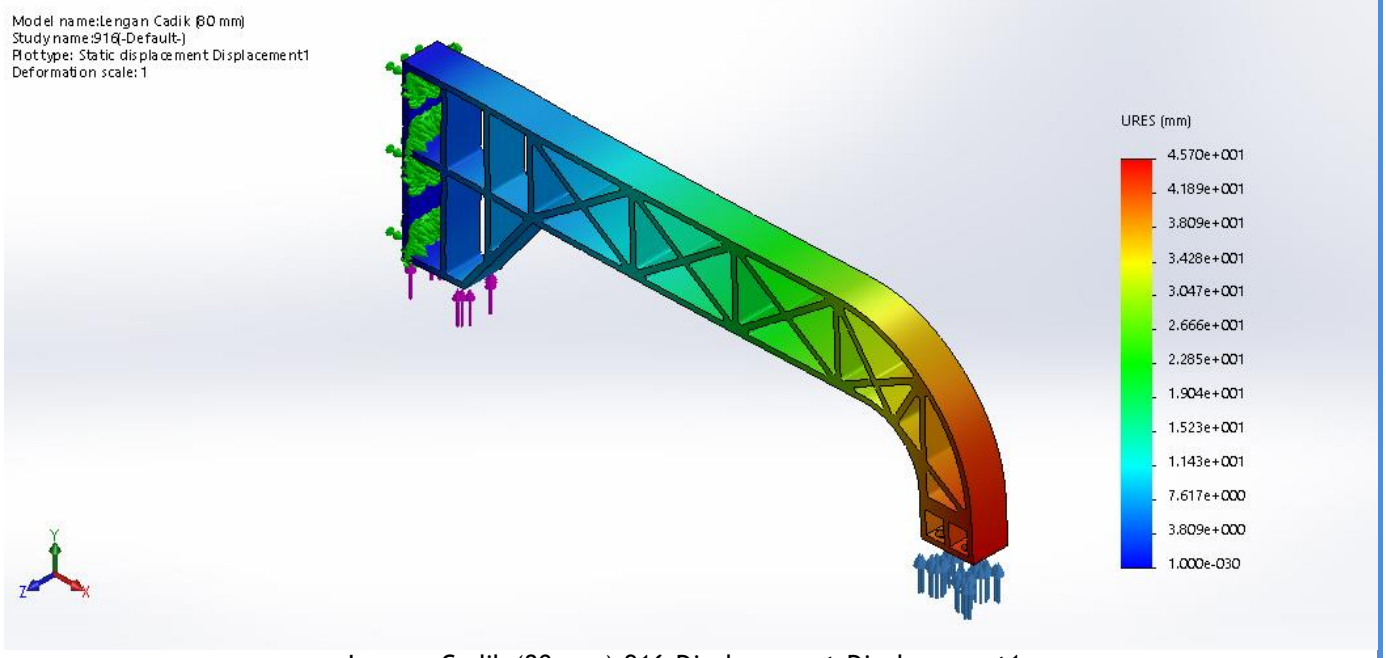
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	6.743e+000N/m^2 Node: 13442	2.116e+007N/m^2 Node: 21139



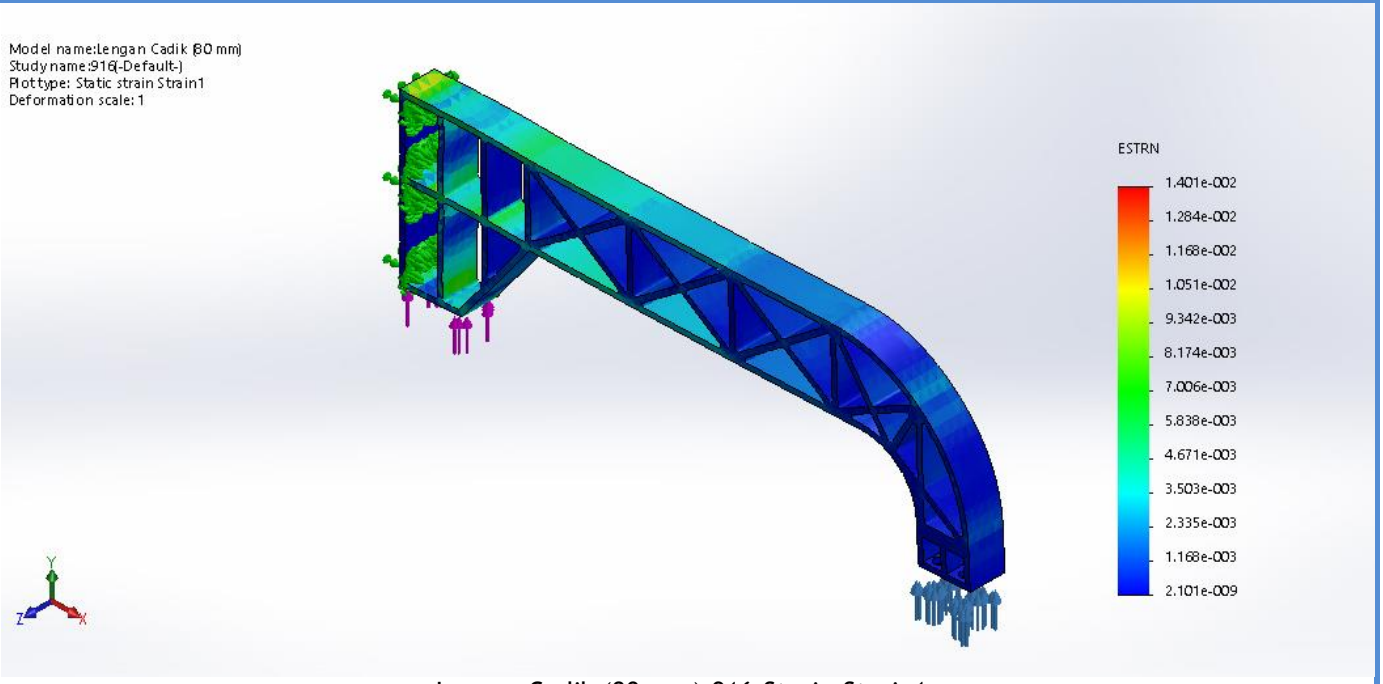
Lengan Cadik (80 mm)-916-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	4.570e+001mm Node: 16009



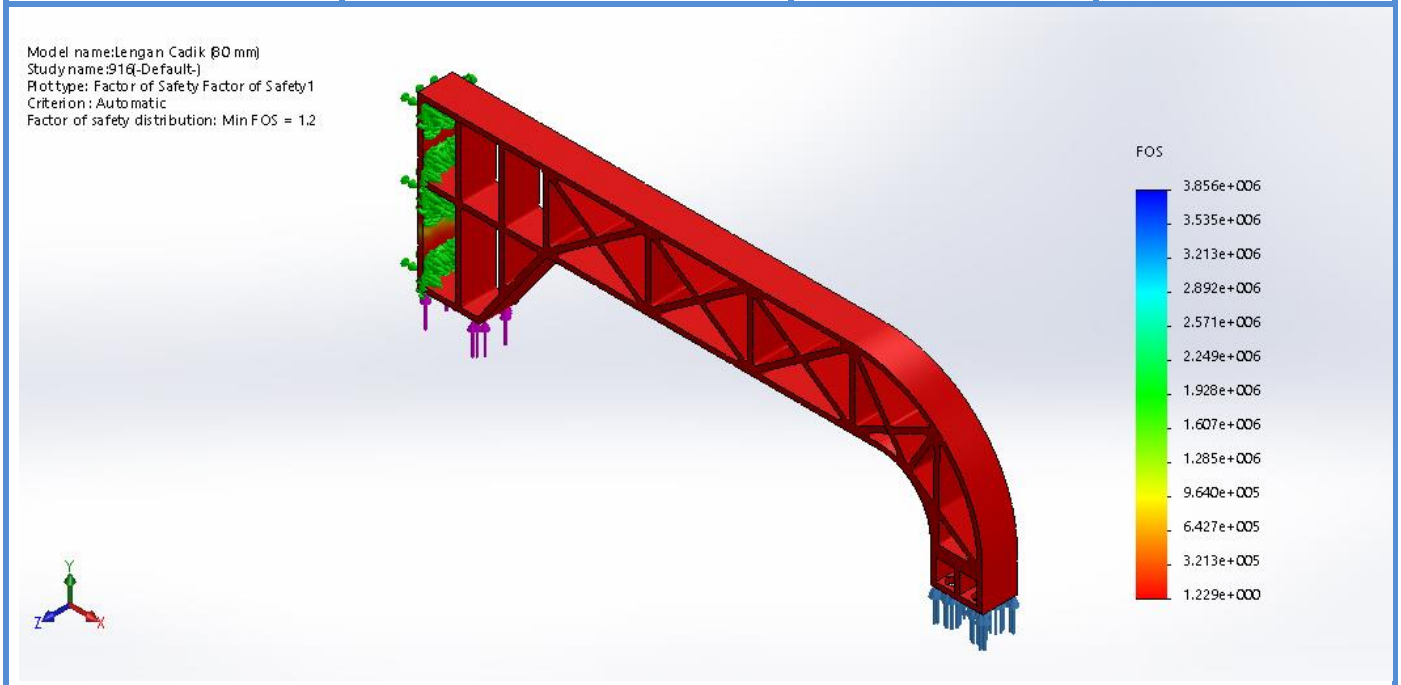
Lengan Cadik (80 mm)-916-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	2.101e-009 Element: 12612	1.401e-002 Element: 652



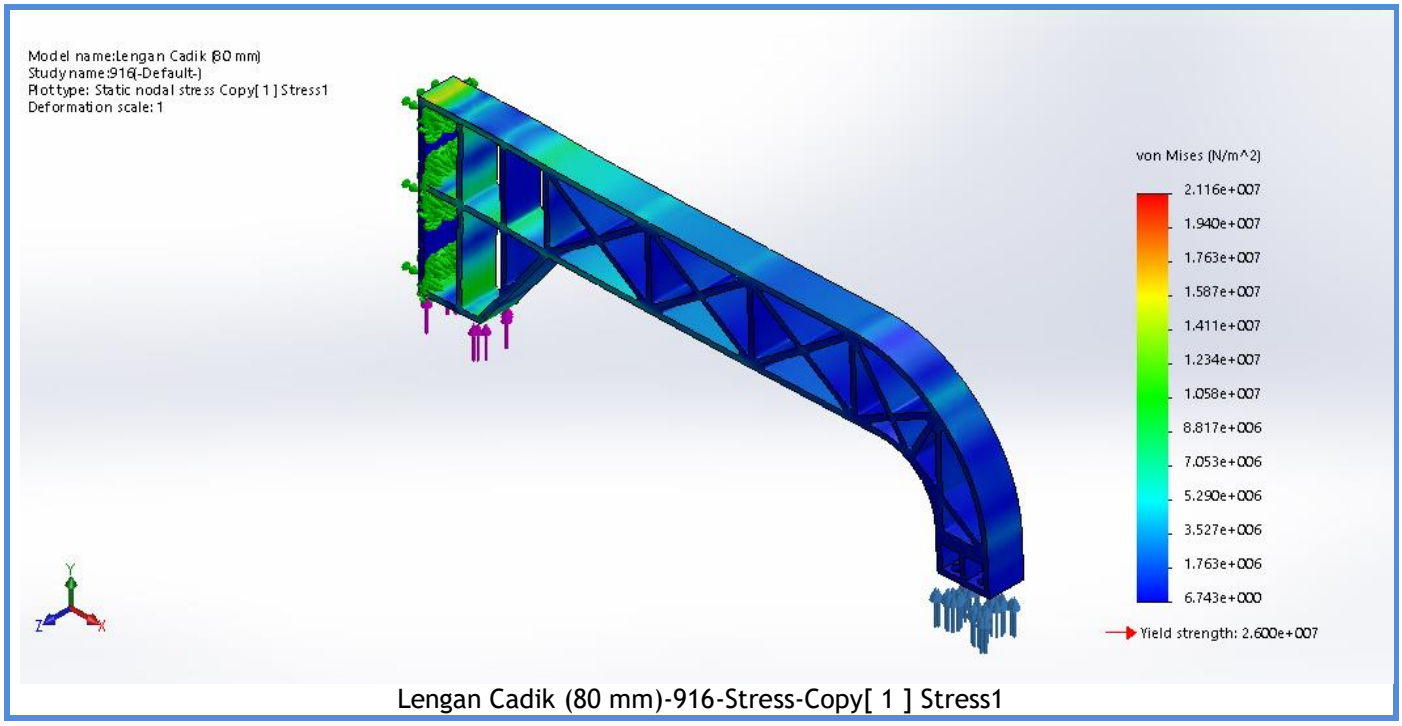
Lengan Cadik (80 mm)-916-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.229e+000 Node: 21139	3.856e+006 Node: 13442

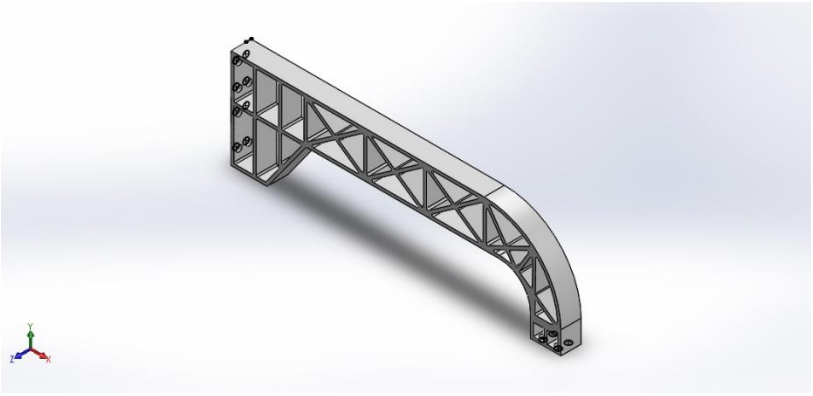


Lengan Cadik (80 mm)-916-Factor of Safety-Factor of Safety1

Name	Type	Min	Max
Copy[1] Stress1	VON: von Mises Stress	6.743e+000N/m^2 Node: 13442	2.116e+007N/m^2 Node: 21139



Lengan Cadik (80 mm)-916-Stress-Copy[1] Stress1



Simulation of Lengan Cadik (80 mm)

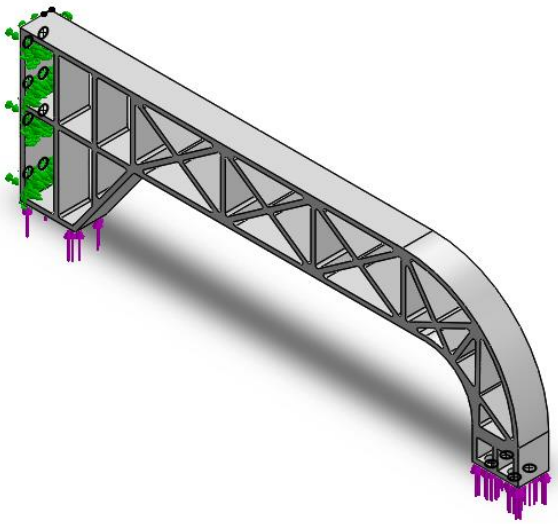
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 1213
Analysis type: Static

Table of Contents

Description

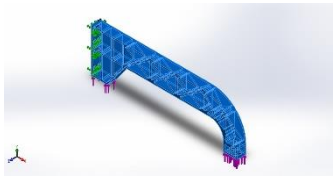
No Data

Model Information



Model name: Lengan Cadik (80 mm)
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude4 	Solid Body	**Mass:7.12664 kg** **Volume:0.00748597 m^3** **Density:952 kg/m^3** **Weight:69.8411 N**	**E:\Kuliah\SolidWorks\Ibar\SolidWork\Lengan Cadik (80 mm).SLDPRT** Jul 09 09:01:44 2018

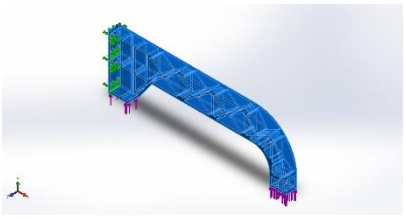
Study Properties

Study name	1213
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	On
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\I bar\SolidWork)

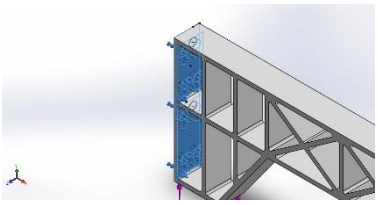
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

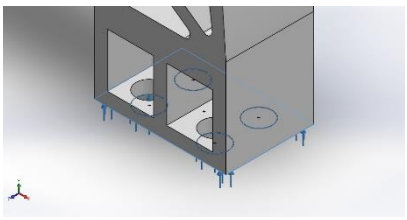
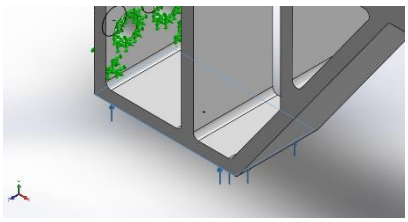
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude4)(Lengan Cadik (80 mm))
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-0.00158068	-3463.65	-0.0390286	3463.65
Reaction Moment(N.m)	0	0	0	0

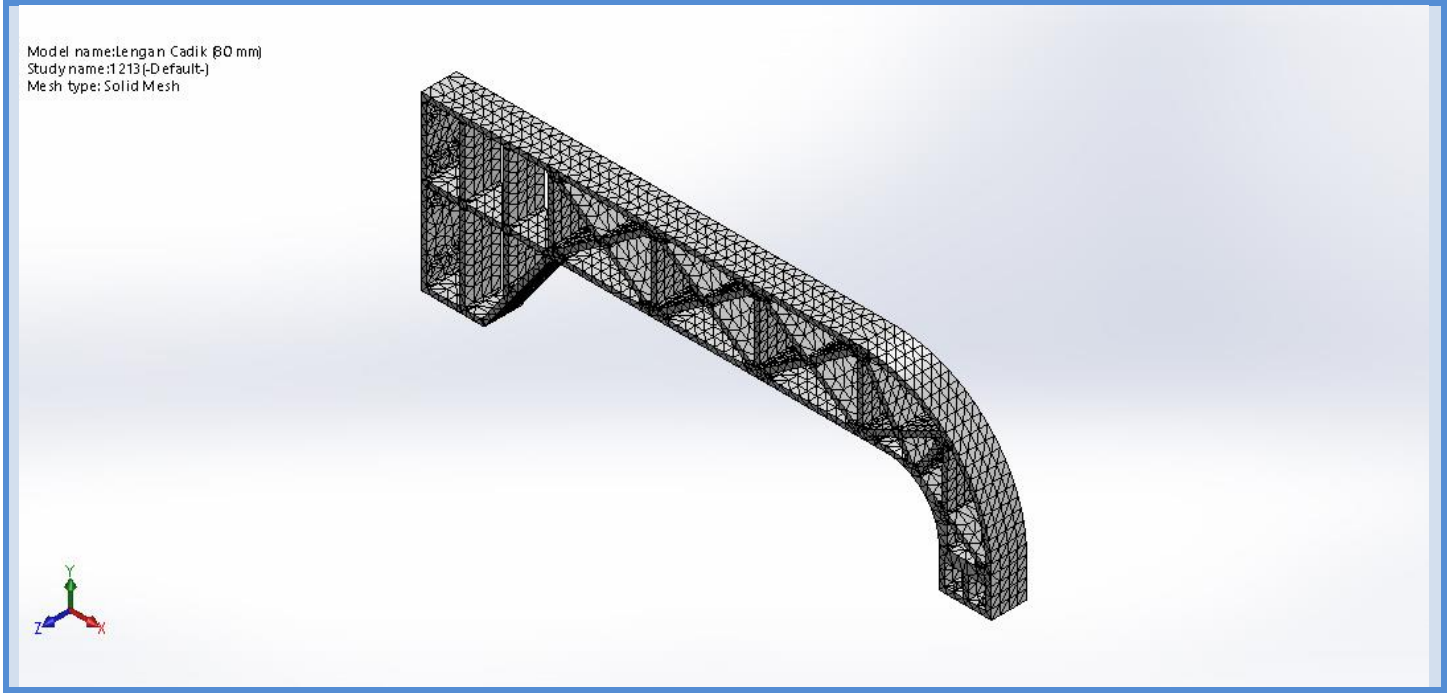
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 1213.18 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	22.458 mm
Tolerance	1.1229 mm
Mesh Quality Plot	High

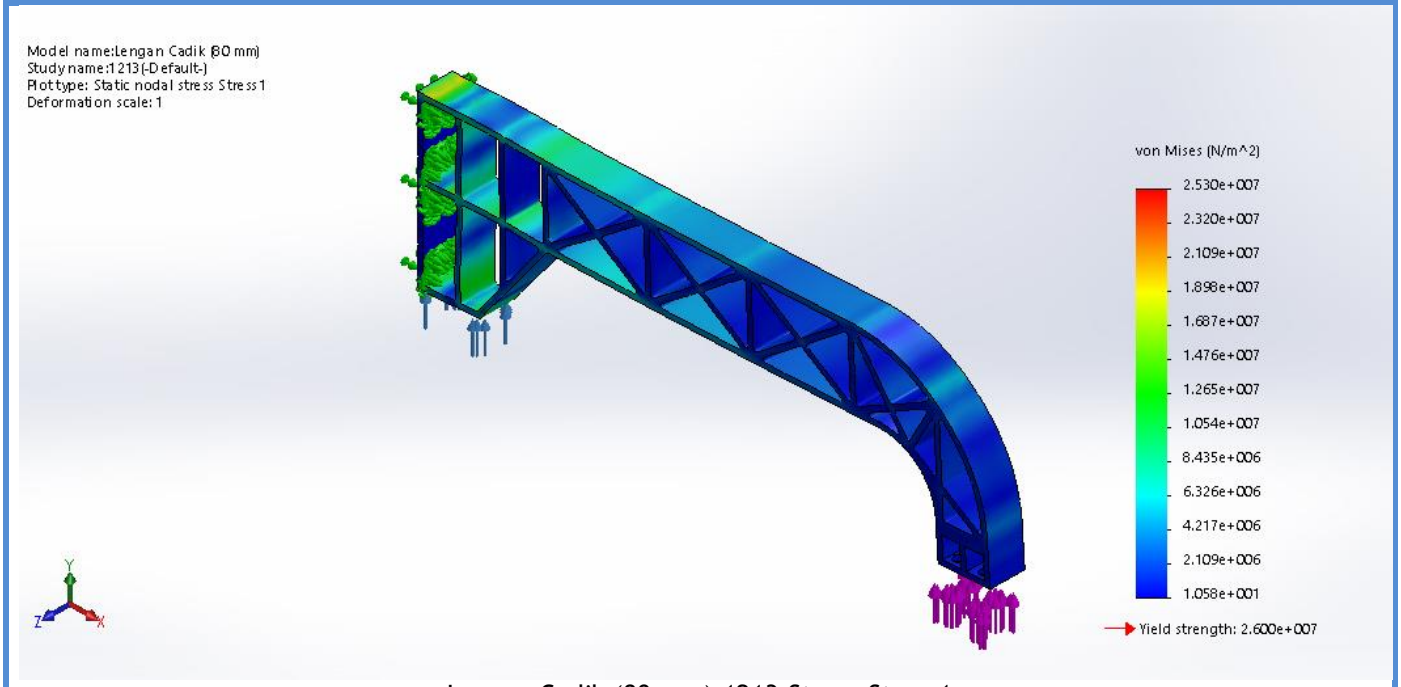
Mesh information - Details

Total Nodes	26674
Total Elements	13094
Maximum Aspect Ratio	17.716
% of elements with Aspect Ratio < 3	75.7
% of elements with Aspect Ratio > 10	0.389
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



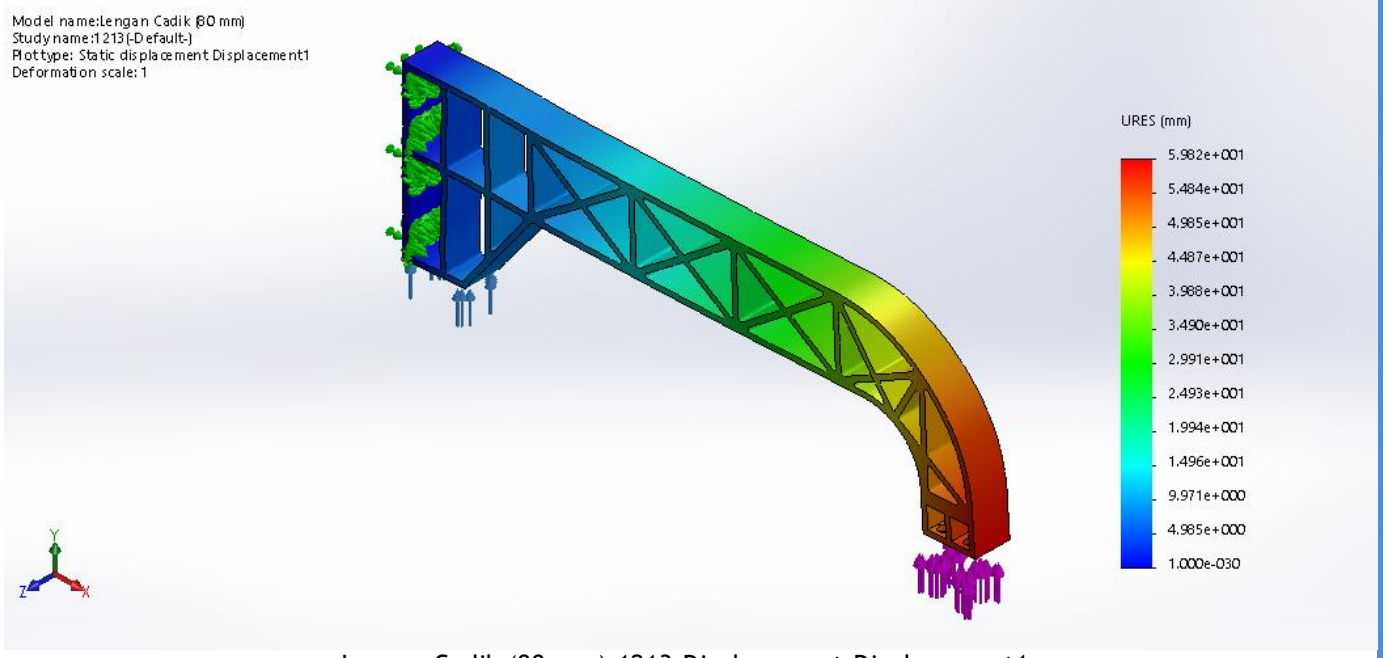
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	1.058e+001N/m^2 Node: 16635	2.530e+007N/m^2 Node: 21139



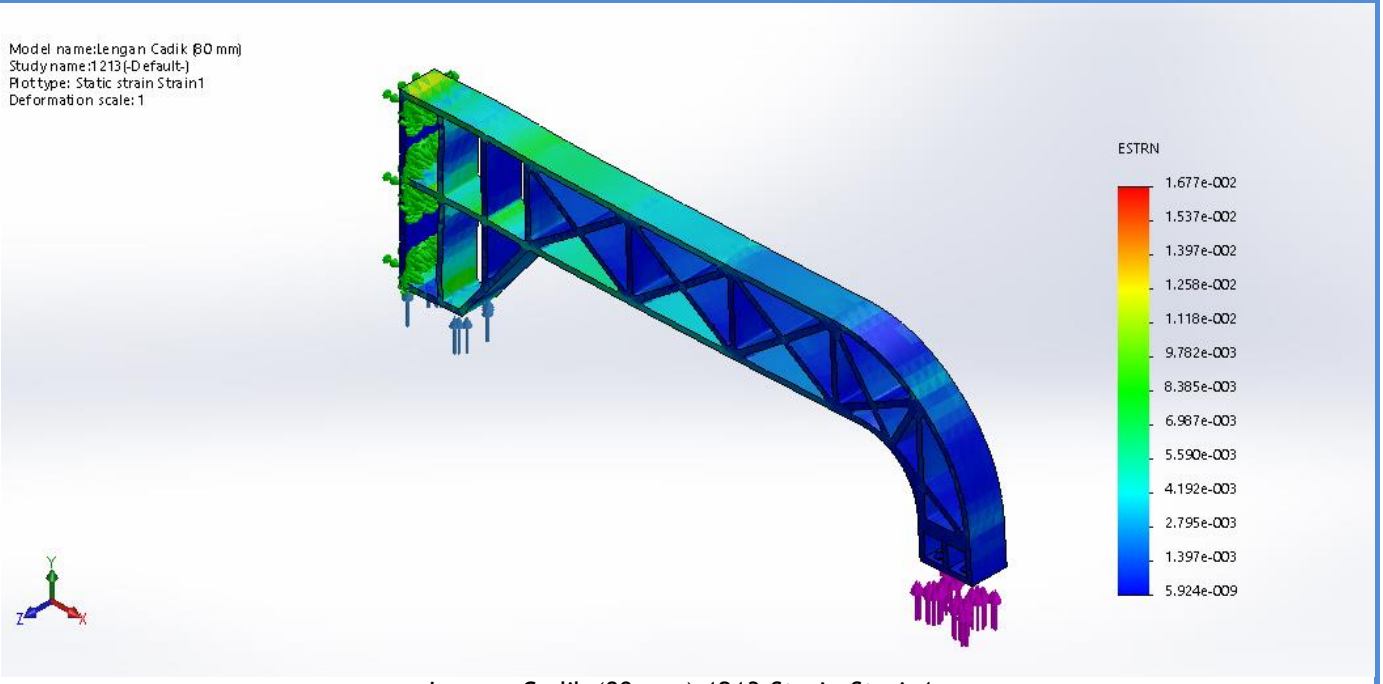
Lengan Cadik (80 mm)-1213-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	5.982e+001mm Node: 16009



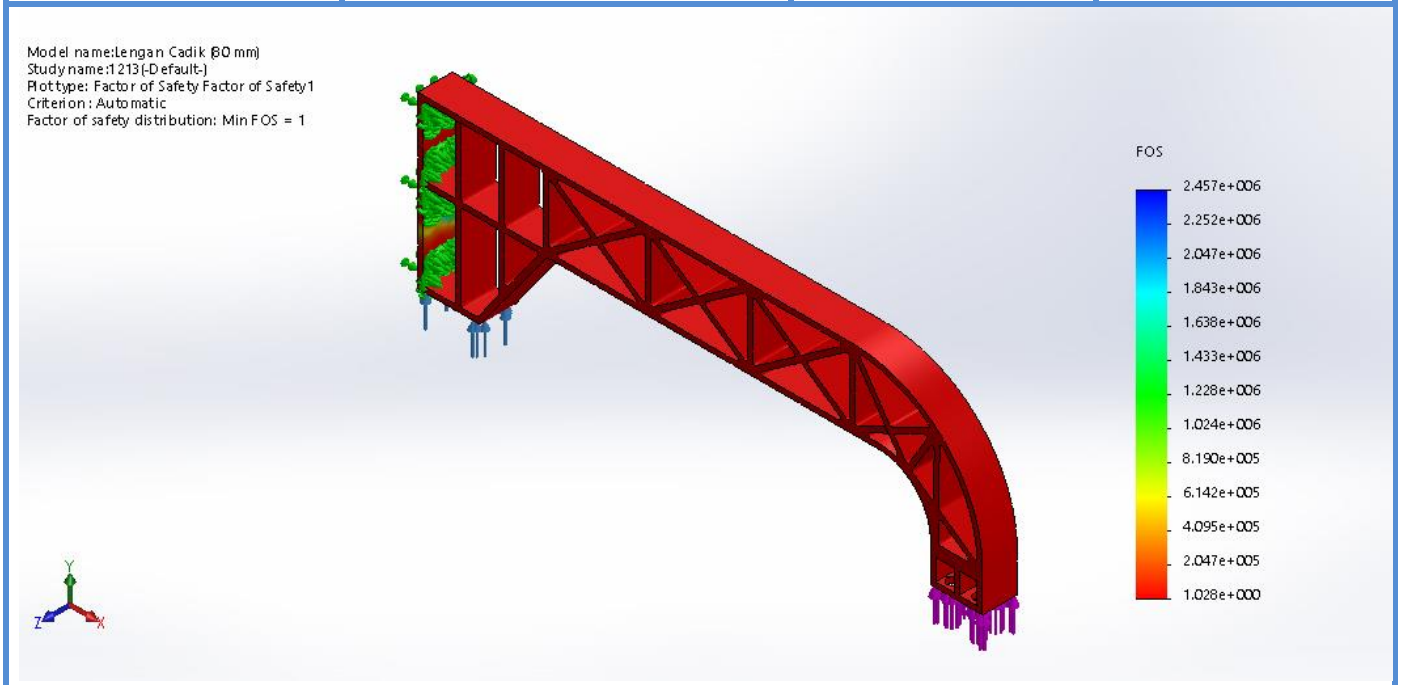
Lengan Cadik (80 mm)-1213-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	5.924e-009 Element: 7150	1.677e-002 Element: 652

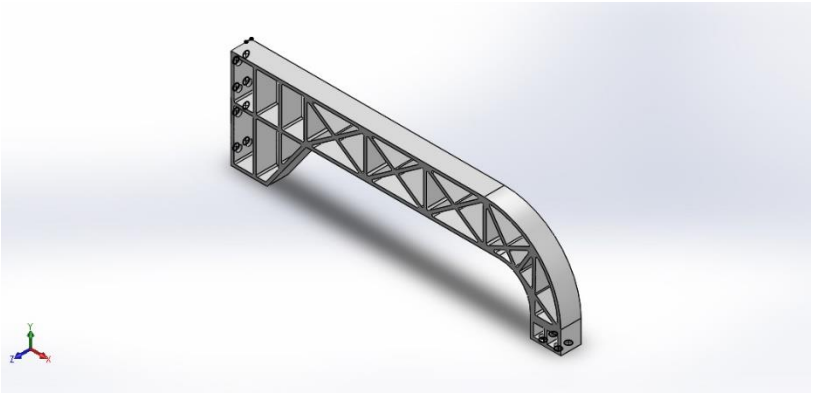


Lengan Cadik (80 mm)-1213-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.028e+000 Node: 21139	2.457e+006 Node: 16635



Lengan Cadik (80 mm)-1213-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (80 mm)

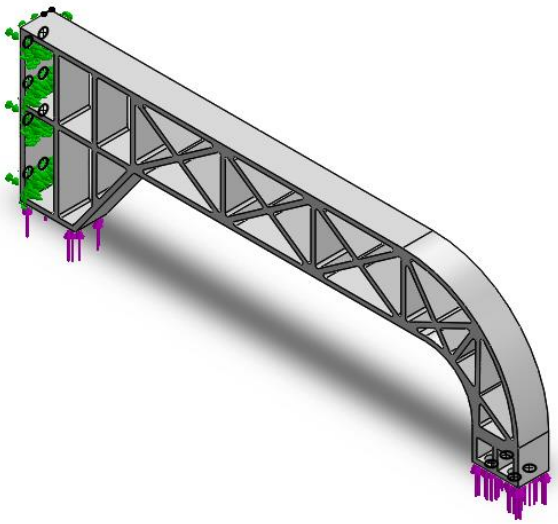
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 1482
Analysis type: Static

Table of Contents

Description

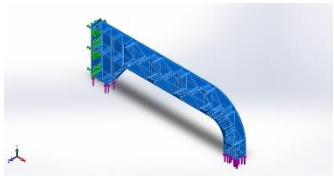
No Data

Model Information



Model name: Lengan Cadik (80 mm)
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude4 	Solid Body	**Mass:7.12664 kg** **Volume:0.00748597 m^3** **Density:952 kg/m^3** **Weight:69.8411 N**	**E:\Kuliah\SolidWorks\Ibar\SolidWork\Lengan Cadik (80 mm).SLDPRT** Jul 09 09:01:44 2018

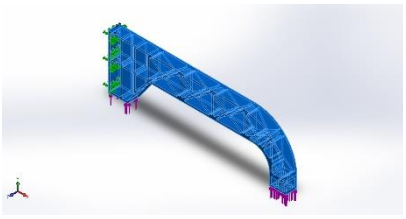
Study Properties

Study name	1482
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	On
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\I bar\SolidWork)

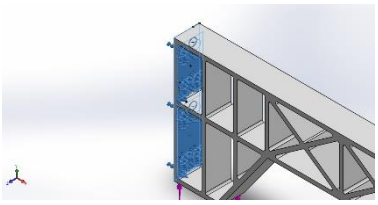
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

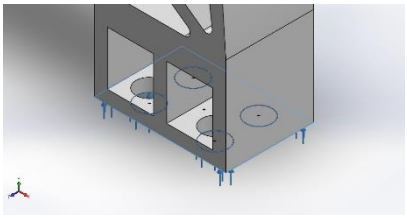
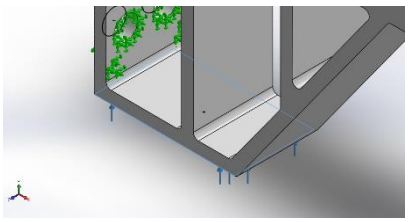
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude4)(Lengan Cadik (80 mm))
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	0.132306	-3732.71	0.0791017	3732.71
Reaction Moment(N.m)	0	0	0	0

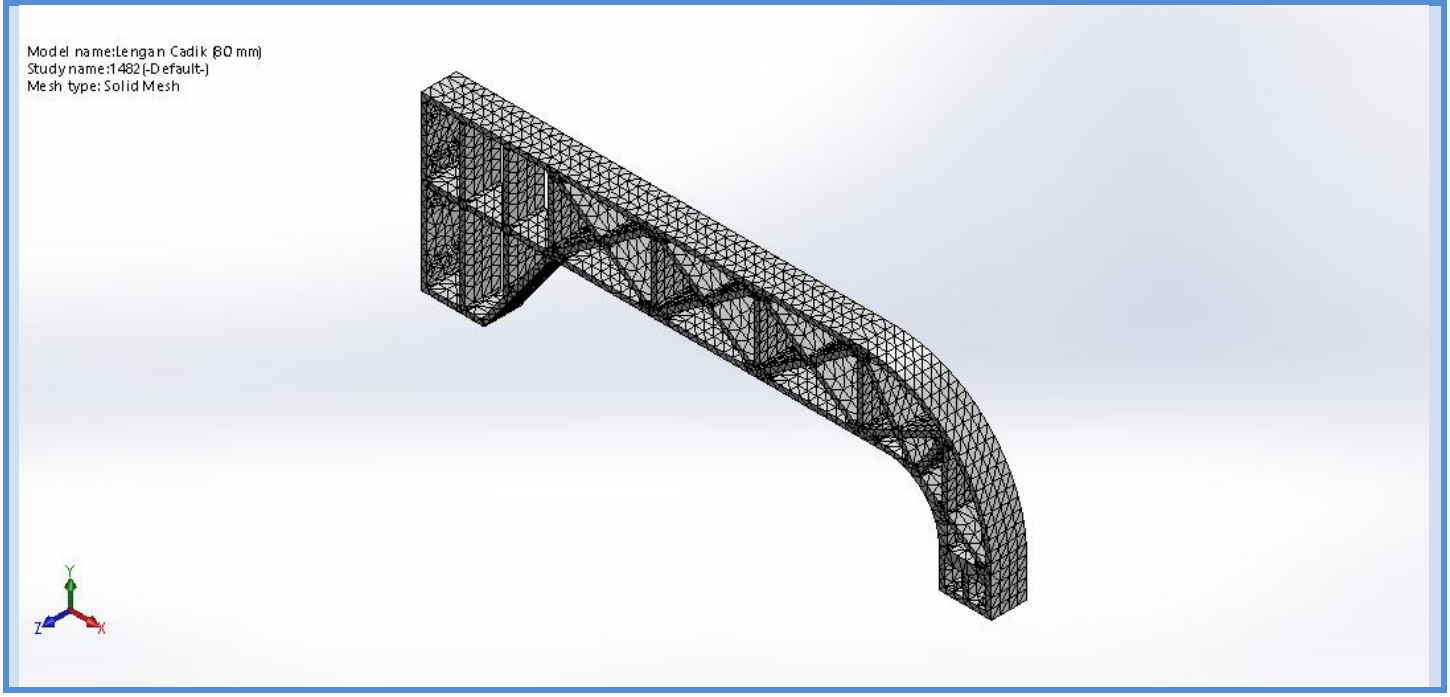
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 1482.27 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	22.458 mm
Tolerance	1.1229 mm
Mesh Quality Plot	High

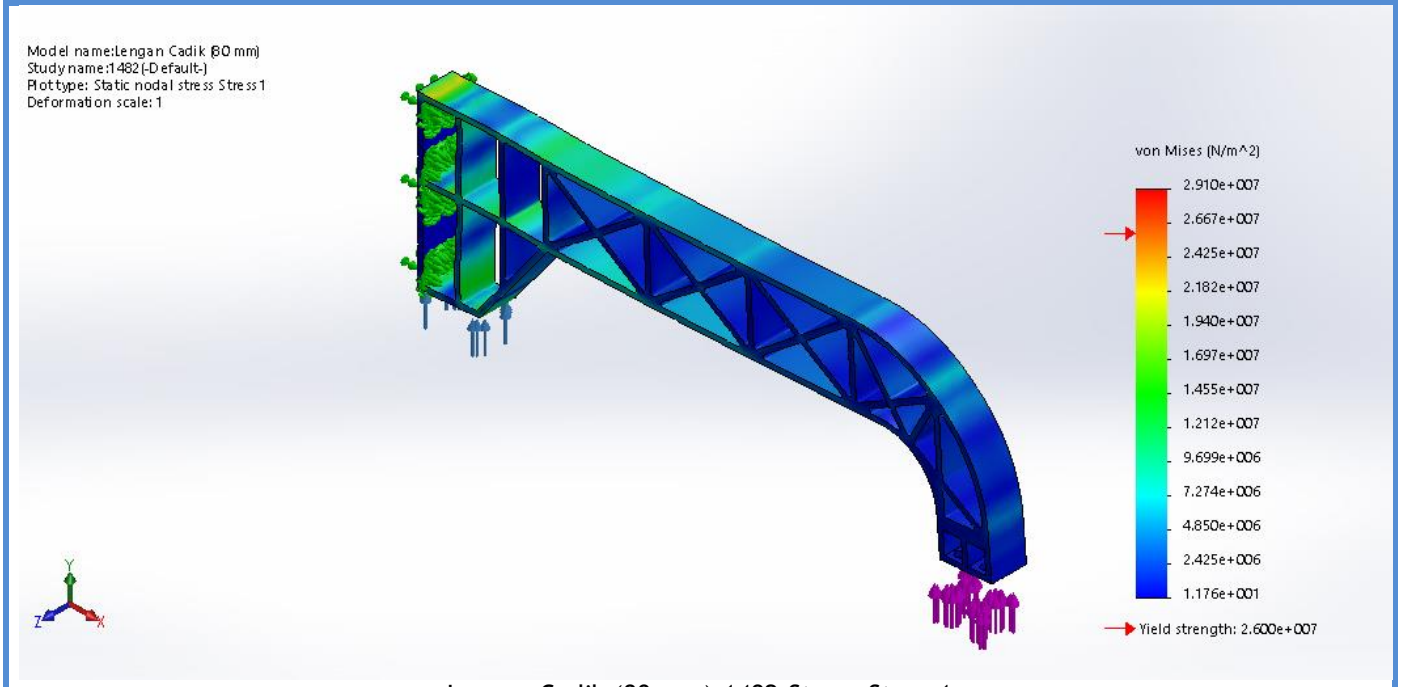
Mesh information - Details

Total Nodes	26674
Total Elements	13094
Maximum Aspect Ratio	17.716
% of elements with Aspect Ratio < 3	75.7
% of elements with Aspect Ratio > 10	0.389
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



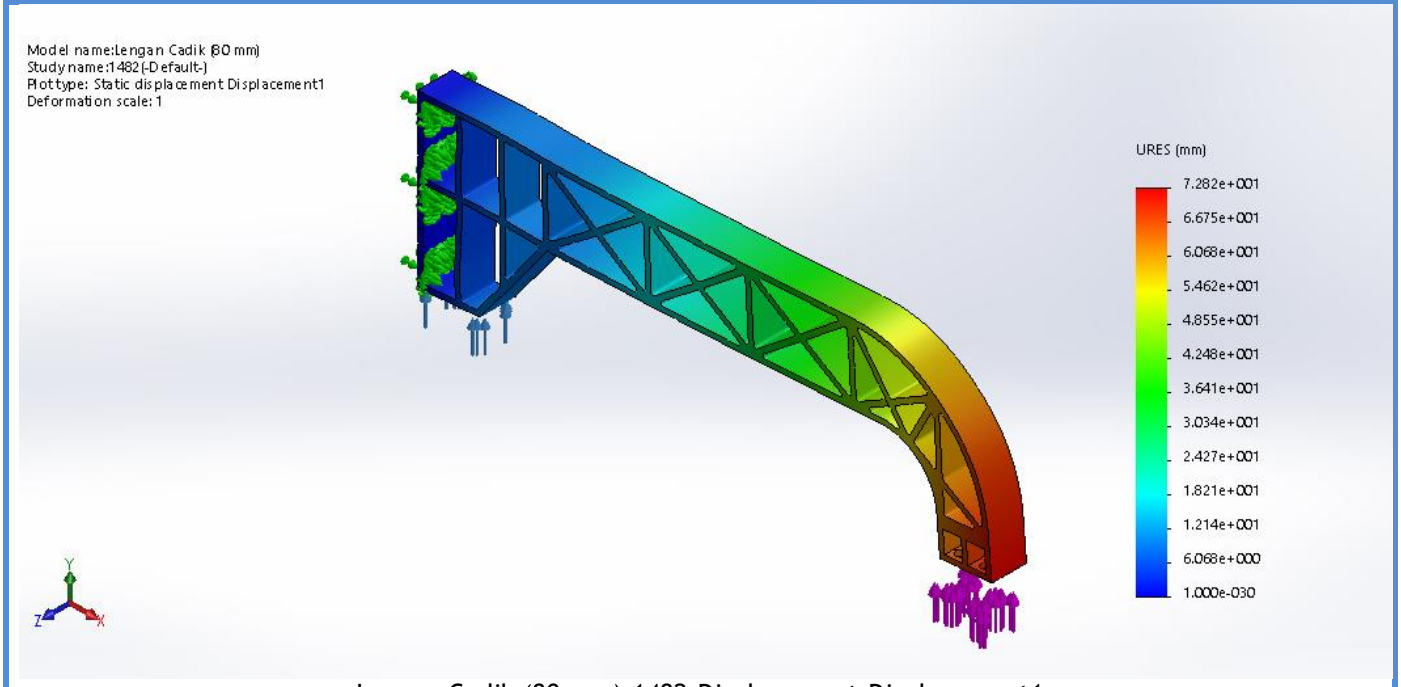
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	1.176e+001N/m^2 Node: 16635	2.910e+007N/m^2 Node: 21139



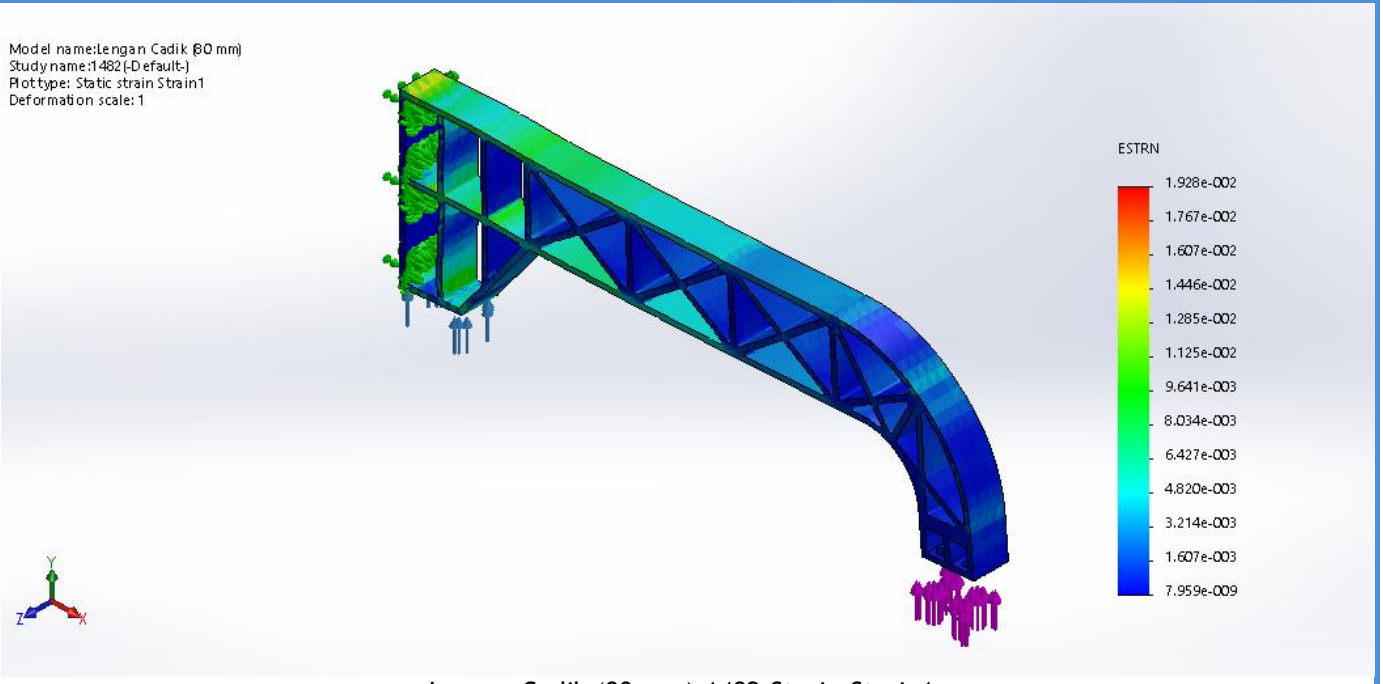
Lengan Cadik (80 mm)-1482-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	7.282e+001mm Node: 1825



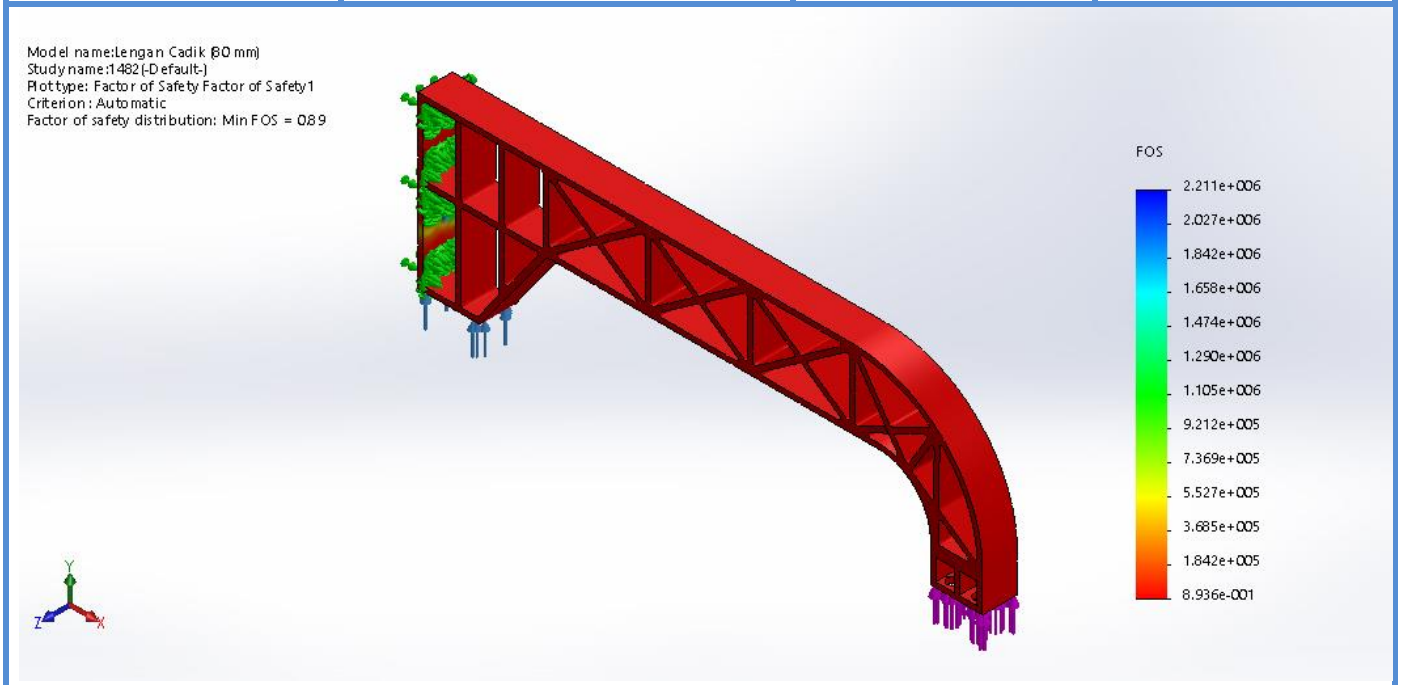
Lengan Cadik (80 mm)-1482-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	7.959e-009 Element: 7150	1.928e-002 Element: 652

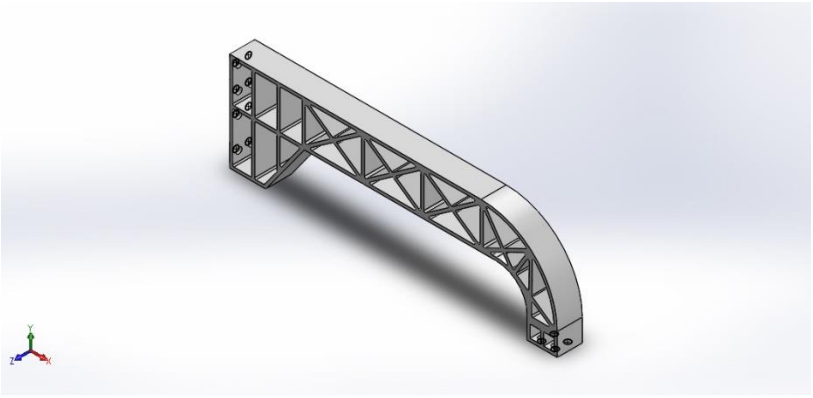


Lengan Cadik (80 mm)-1482-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	8.936e-001 Node: 21139	2.211e+006 Node: 16635



Lengan Cadik (80 mm)-1482-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik Redraw Simulation

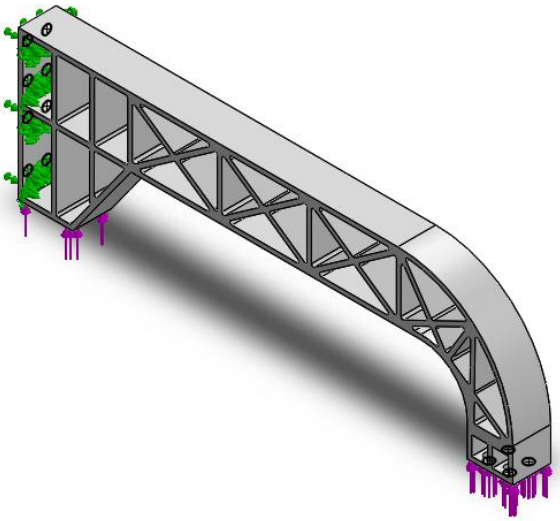
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 133
Analysis type: Static

Table of Contents

Description

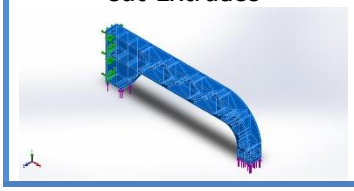
No Data

Model Information



Model name: Lengan Cadik Redraw Simulation
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude3 	Solid Body	**Mass:8.92401 kg** **Volume:0.00937397 m^3** **Density:952 kg/m^3** **Weight:87.4553 N**	**E:\Kuliah\SolidWorks\lbar\SolidWork\Lengan Cadik Redraw Simulation.SLDPRT** Jul 09 09:15:00 2018

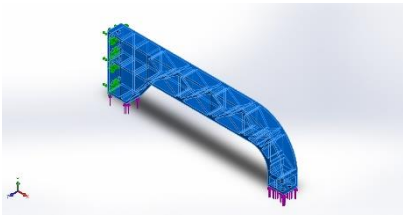
Study Properties

Study name	133
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\I bar\SolidWork)

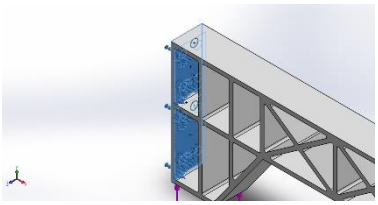
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

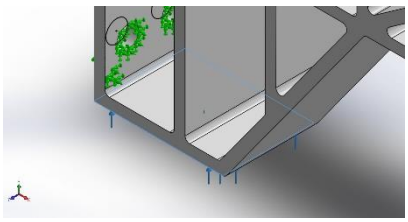
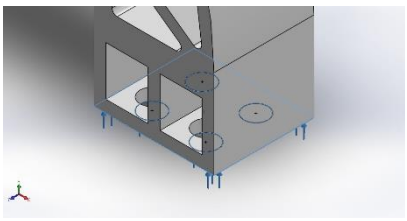
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude3)(Lengan Cadik Redraw Simulation)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	0.377845	-2383.88	0.192335	2383.88
Reaction Moment(N.m)	0	0	0	0

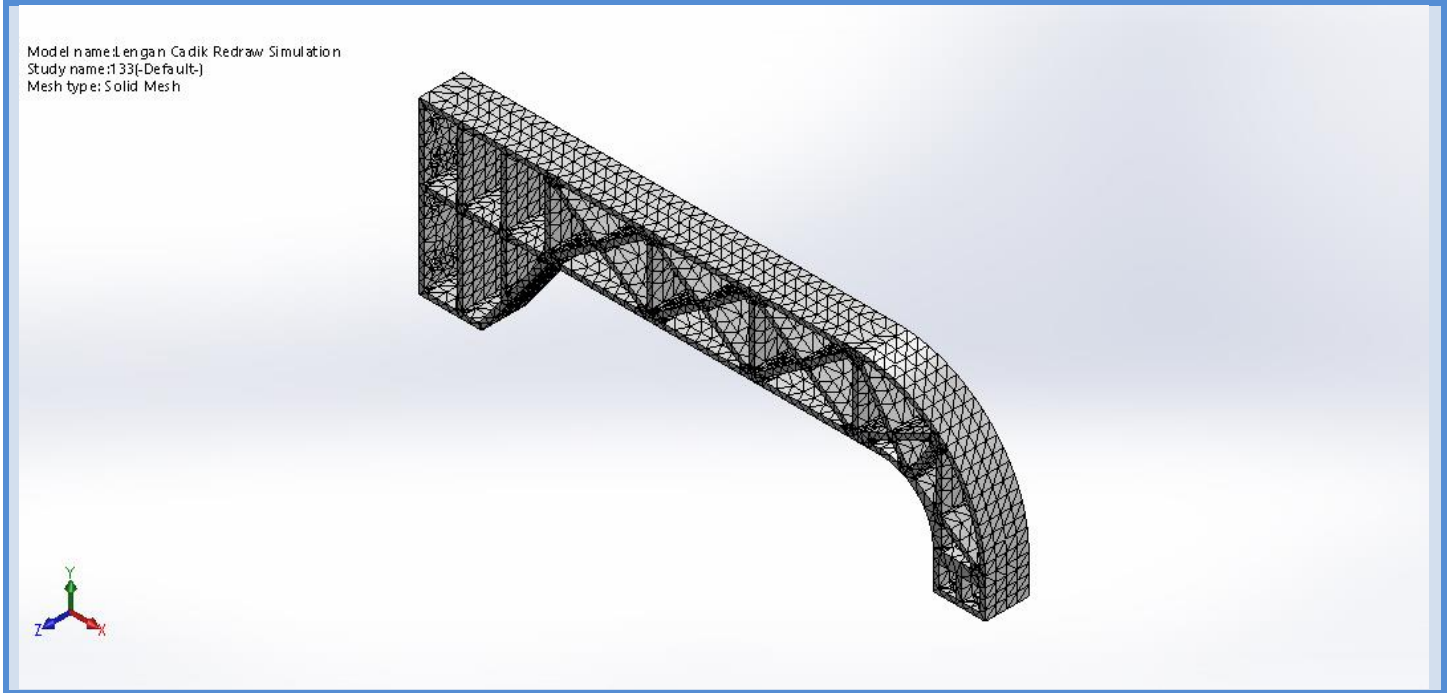
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 133.55 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	24.7297 mm
Tolerance	1.23649 mm
Mesh Quality Plot	High

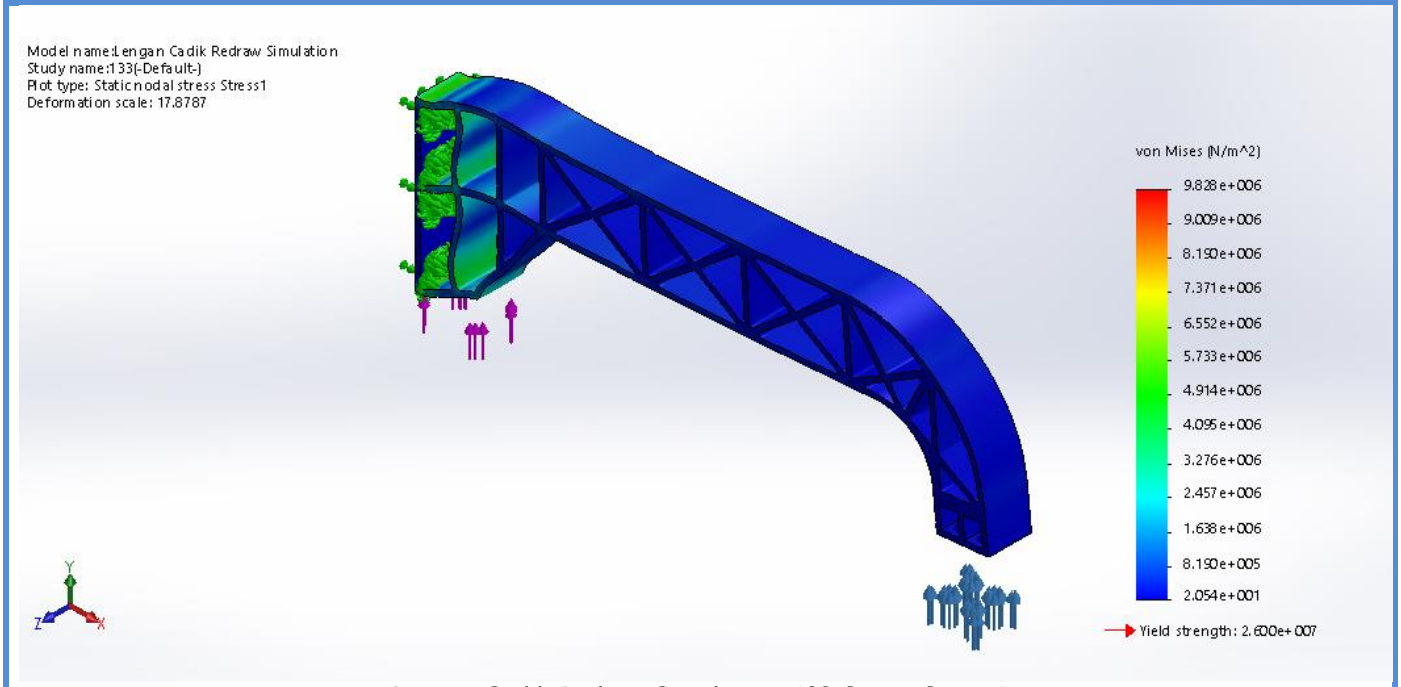
Mesh information - Details

Total Nodes	25275
Total Elements	12419
Maximum Aspect Ratio	17.573
% of elements with Aspect Ratio < 3	68.8
% of elements with Aspect Ratio > 10	0.467
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



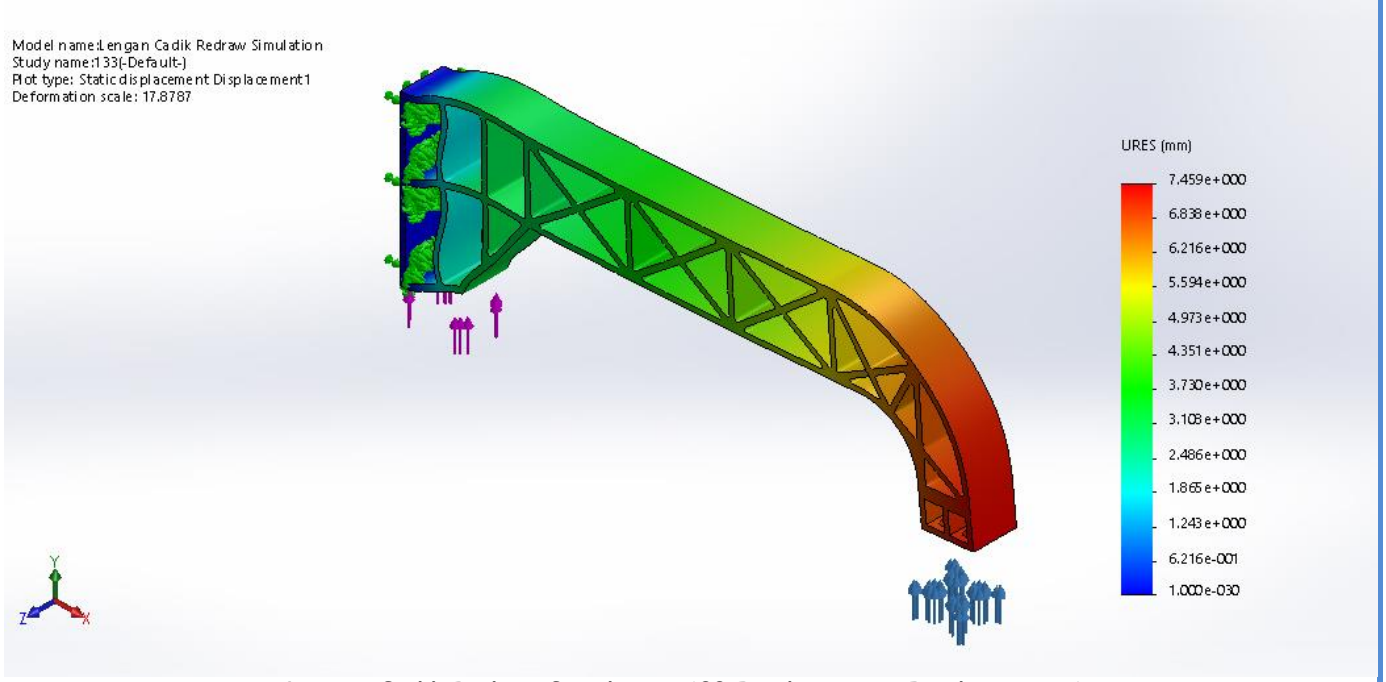
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	2.054e+001N/m^2 Node: 12603	9.828e+006N/m^2 Node: 19676



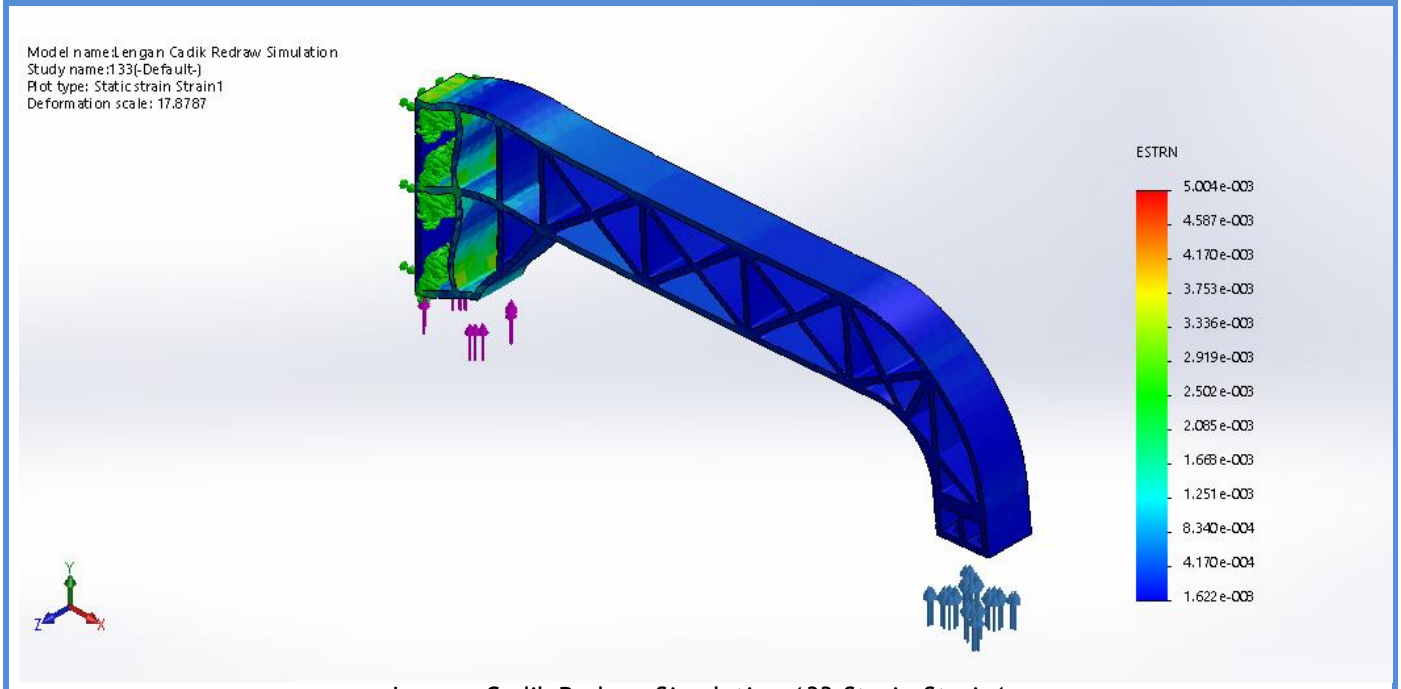
Lengan Cadik Redraw Simulation-133-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	7.459e+000mm Node: 2510



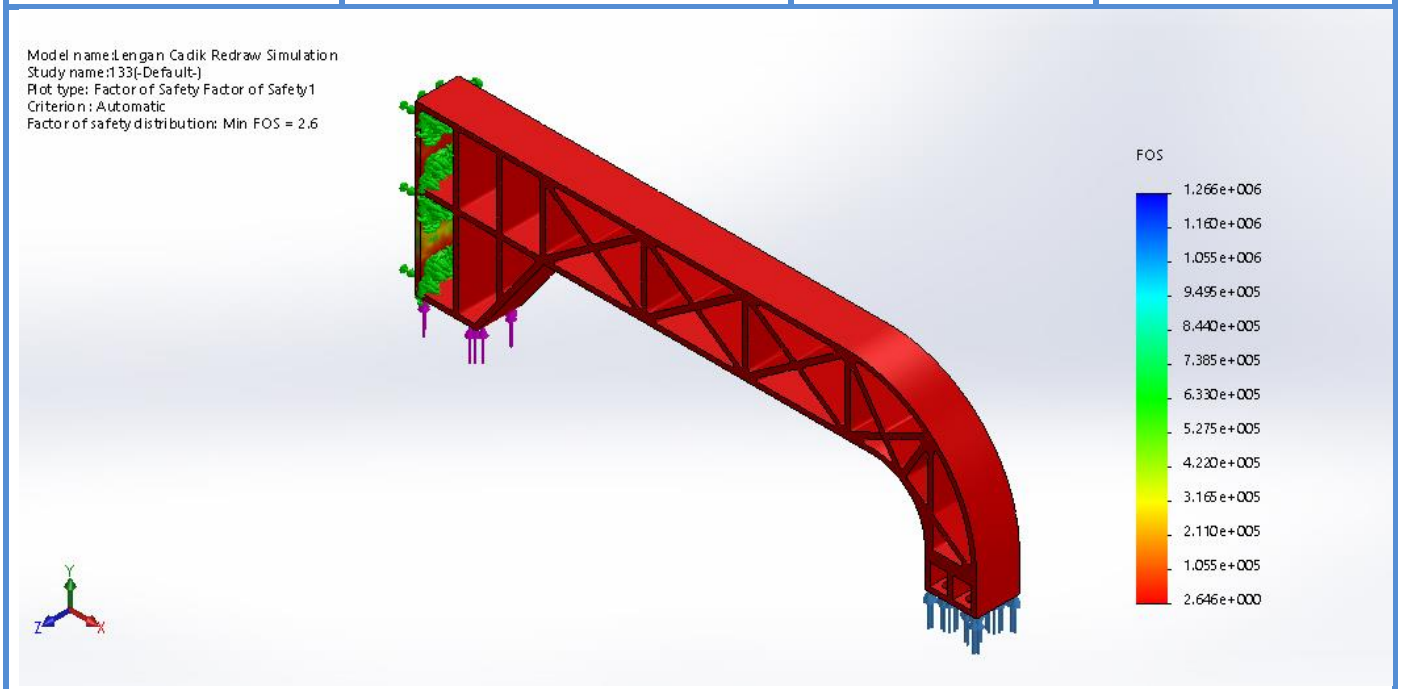
Lengan Cadik Redraw Simulation-133-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	1.622e-008 Element: 7595	5.004e-003 Element: 2573

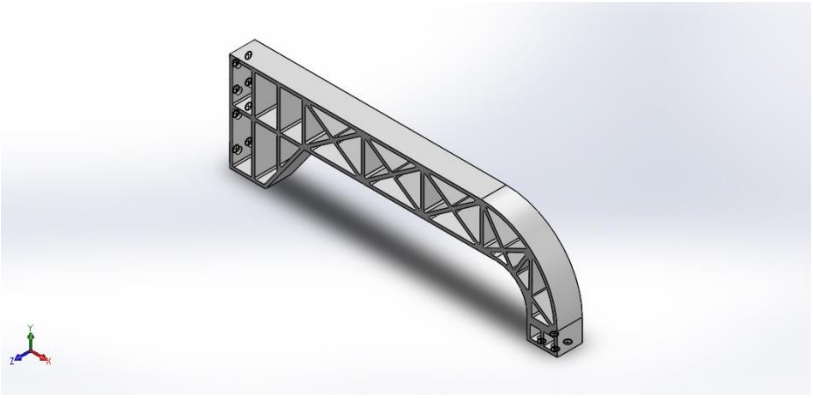


Lengan Cadik Redraw Simulation-133-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	2.646e+000 Node: 19676	1.266e+006 Node: 12603



Lengan Cadik Redraw Simulation-133-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik Redraw Simulation

Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 361
Analysis type: Static

Table of Contents

Description

No Data

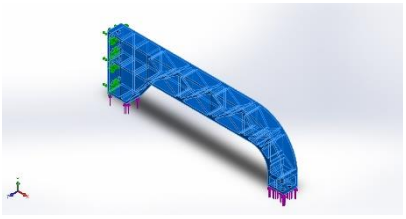
Study Properties

Study name	361
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\I bar\SolidWork)

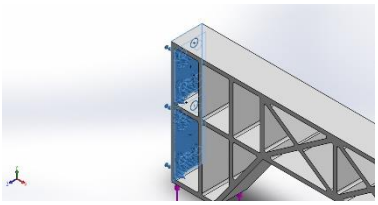
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

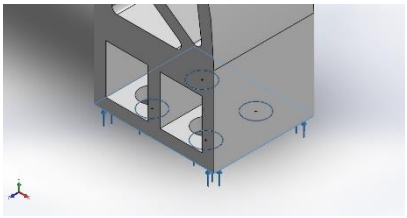
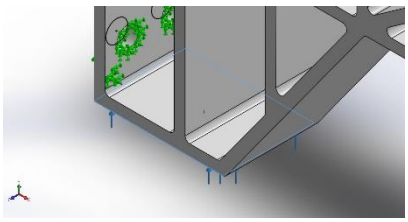
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude3)(Lengan Cadik Redraw Simulation)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	0.414814	-2611.95	-0.200463	2611.95
Reaction Moment(N.m)	0	0	0	0

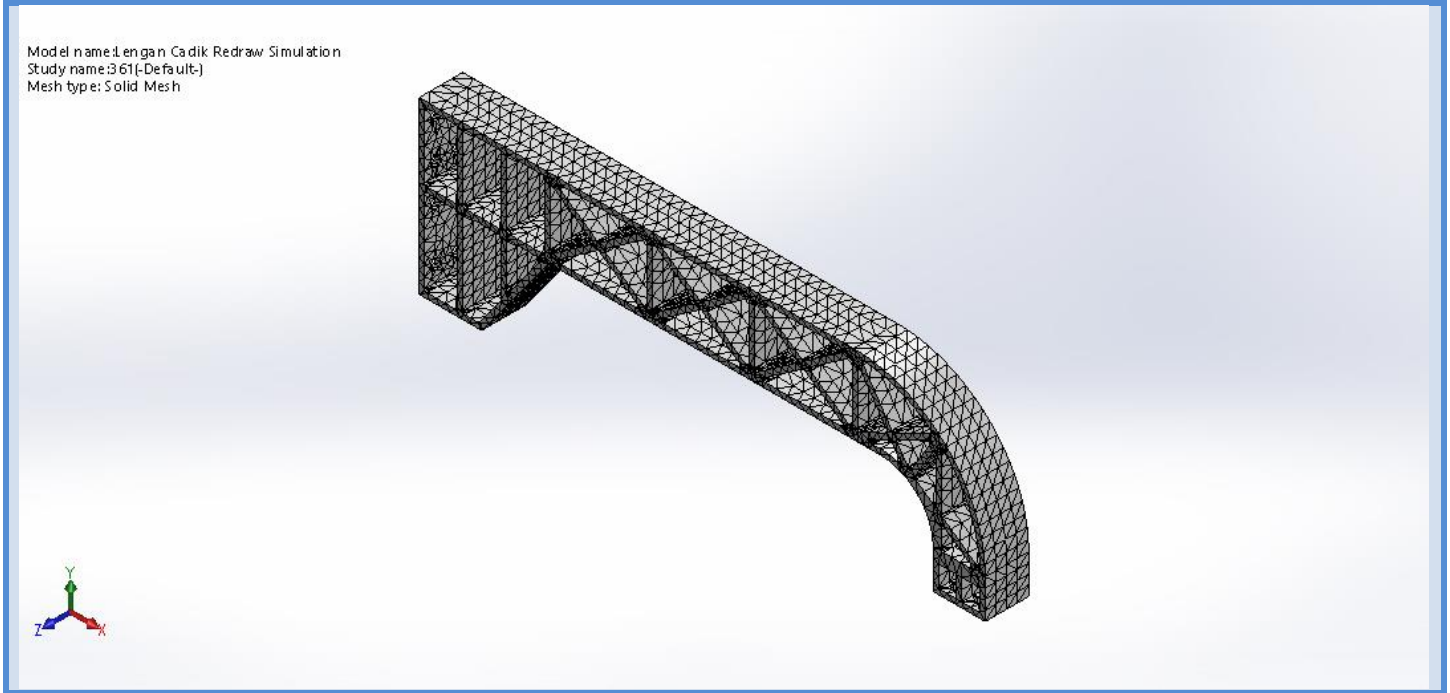
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 361.76 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	24.7297 mm
Tolerance	1.23649 mm
Mesh Quality Plot	High

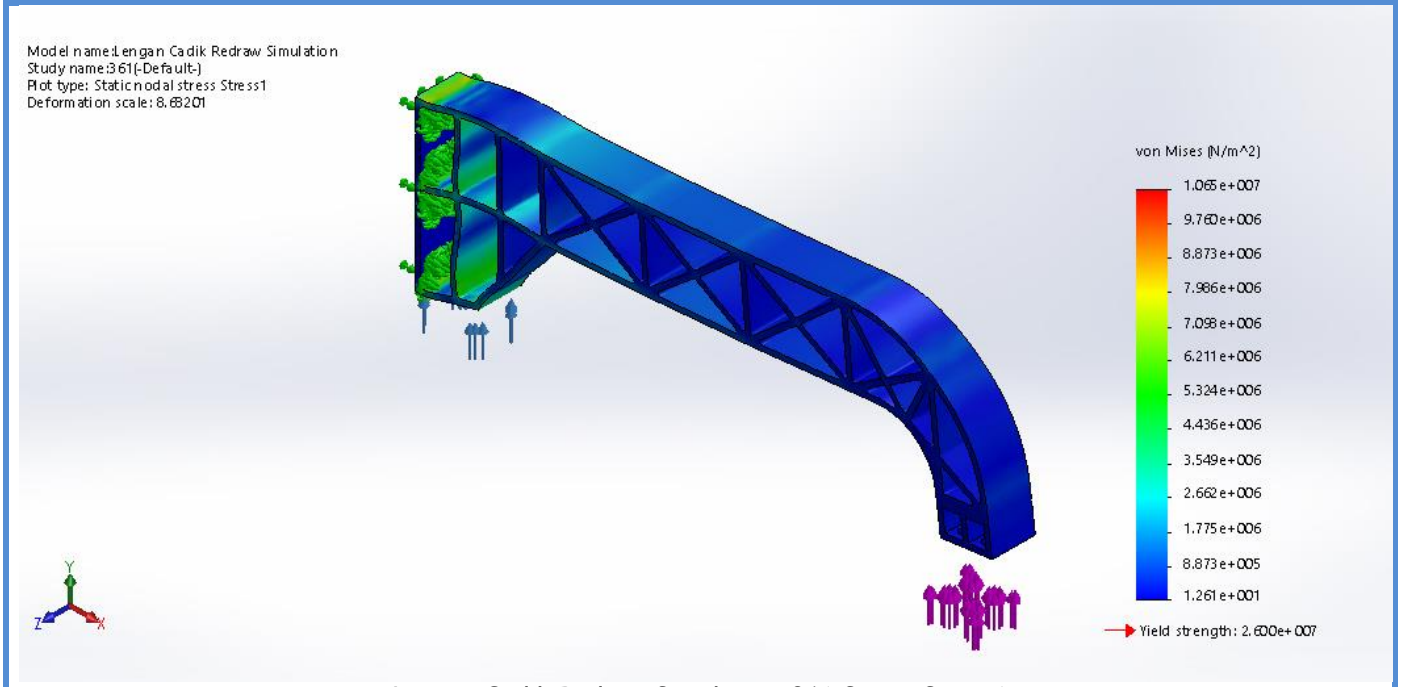
Mesh information - Details

Total Nodes	25275
Total Elements	12419
Maximum Aspect Ratio	17.573
% of elements with Aspect Ratio < 3	68.8
% of elements with Aspect Ratio > 10	0.467
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



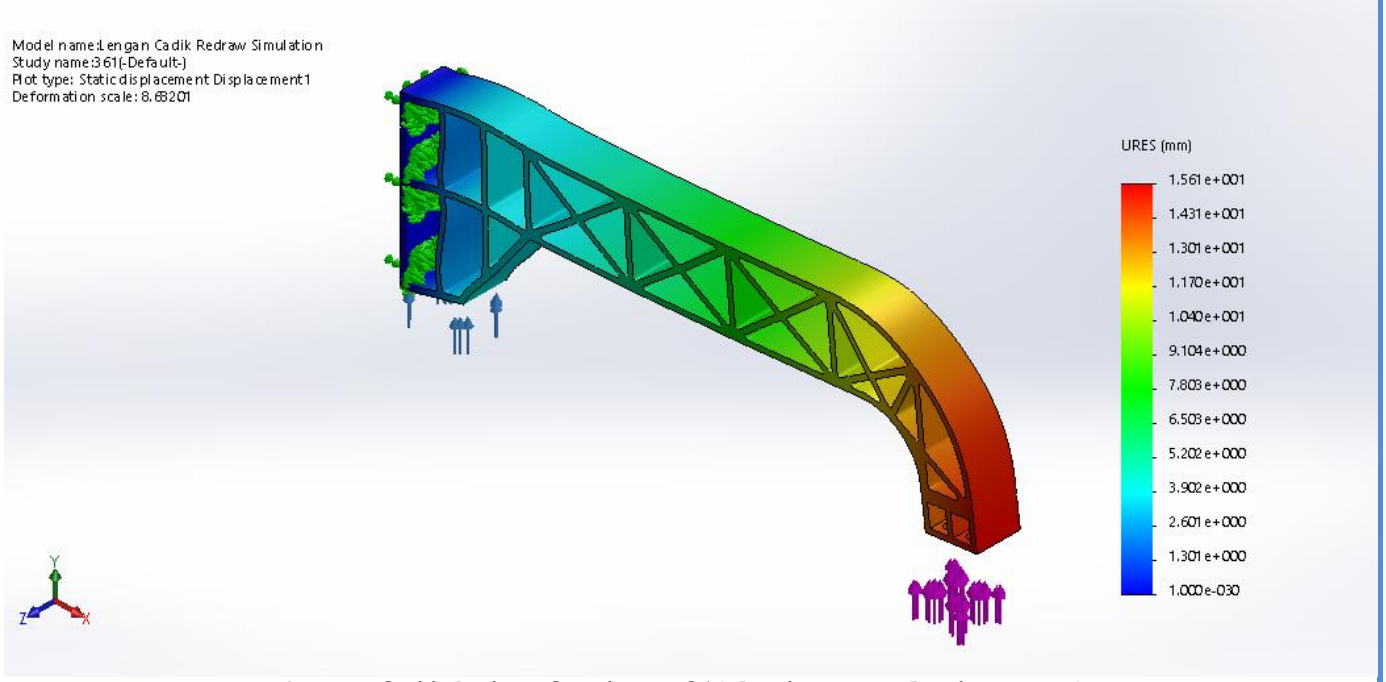
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	1.261e+001N/m^2 Node: 12403	1.065e+007N/m^2 Node: 19787



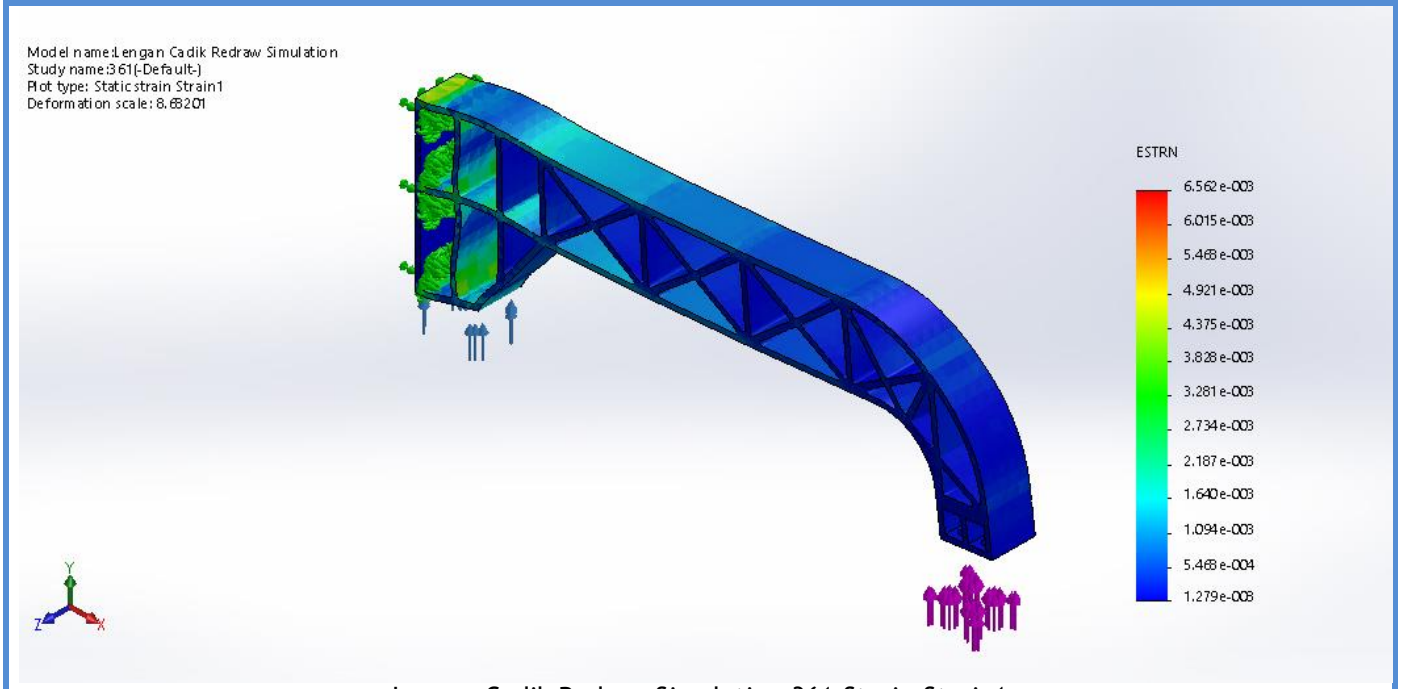
Lengan Cadik Redraw Simulation-361-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	1.561e+001mm Node: 2509



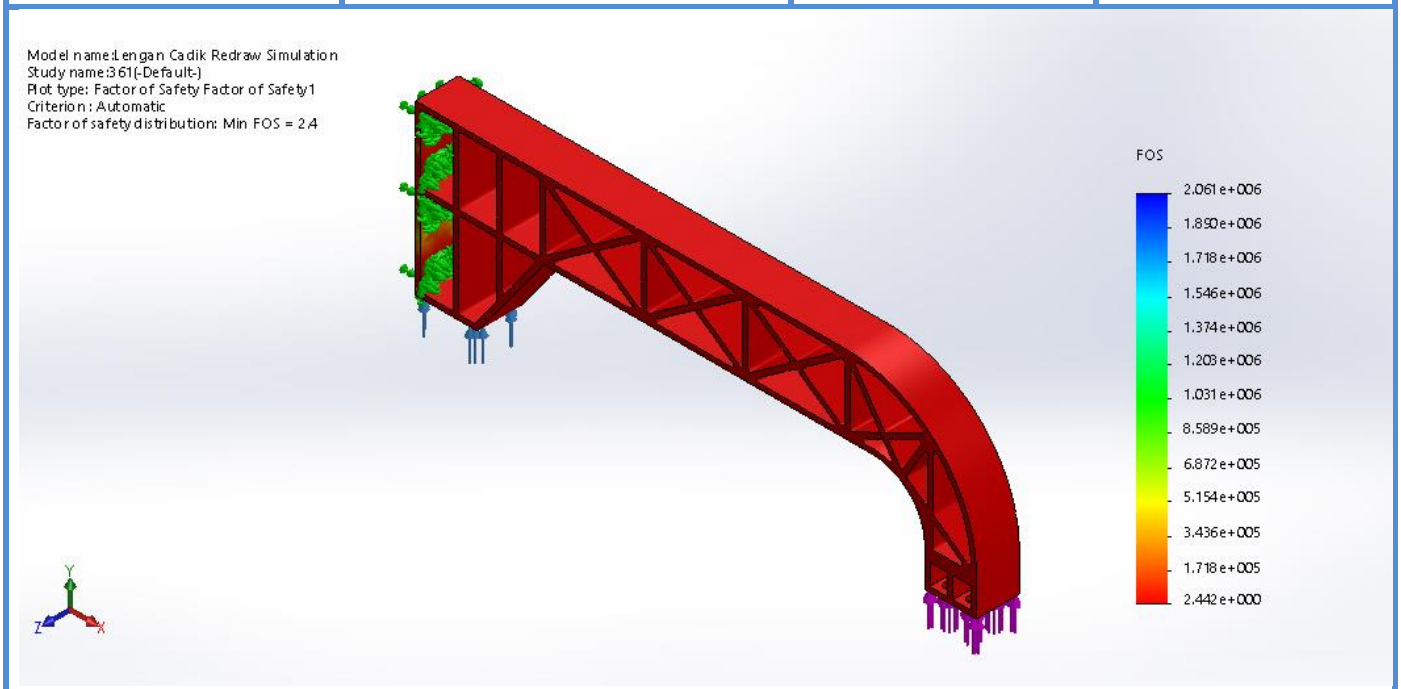
Lengan Cadik Redraw Simulation-361-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	1.279e-008 Element: 6499	6.562e-003 Element: 2573

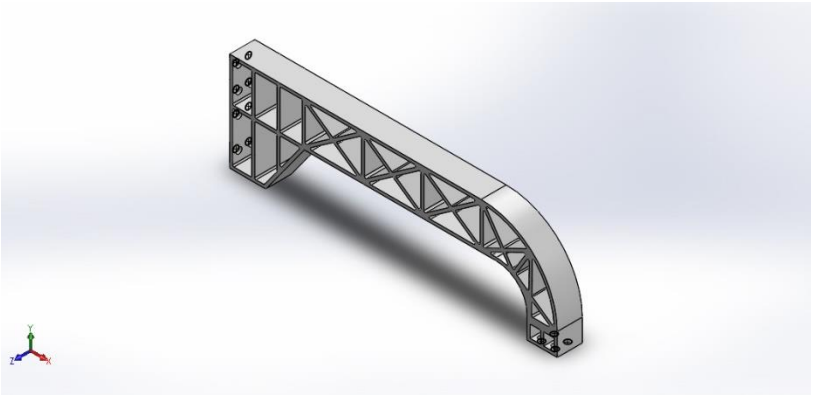


Lengan Cadik Redraw Simulation-361-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	2.442e+000 Node: 19787	2.061e+006 Node: 12403



Lengan Cadik Redraw Simulation-361-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik Redraw Simulation

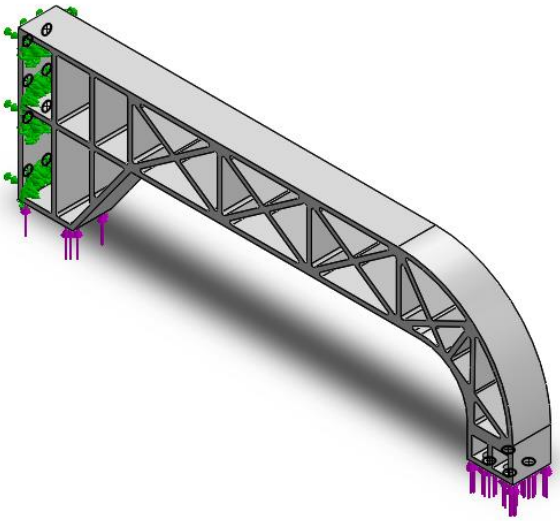
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 633
Analysis type: Static

Table of Contents

Description

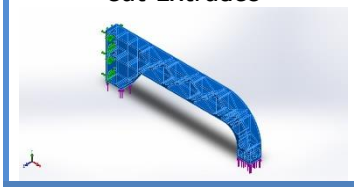
No Data

Model Information



Model name: Lengan Cadik Redraw Simulation
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude3 	Solid Body	**Mass:8.92401 kg** **Volume:0.00937397 m^3** **Density:952 kg/m^3** **Weight:87.4553 N**	**E:\Kuliah\SolidWorks\lbar\SolidWork\Lengan Cadik Redraw Simulation.SLDPRT** Jul 09 09:15:00 2018

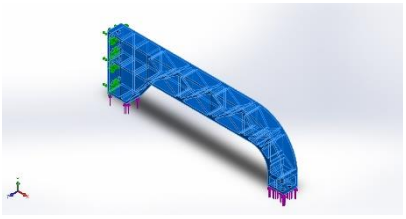
Study Properties

Study name	633
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\Ibar\SolidWork)

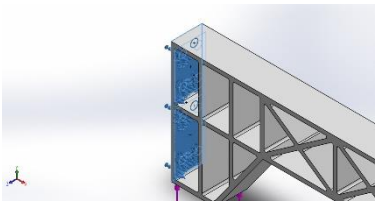
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

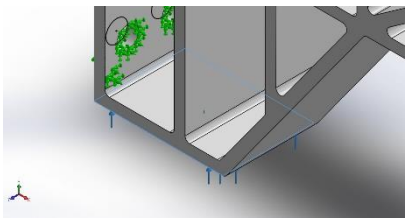
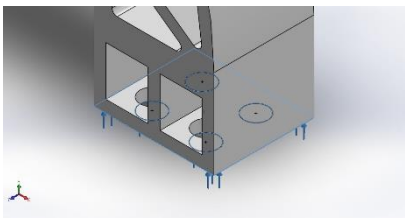
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude3)(Lengan Cadik Redraw Simulation)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-0.70558	-2883.34	-0.643175	2883.34
Reaction Moment(N.m)	0	0	0	0

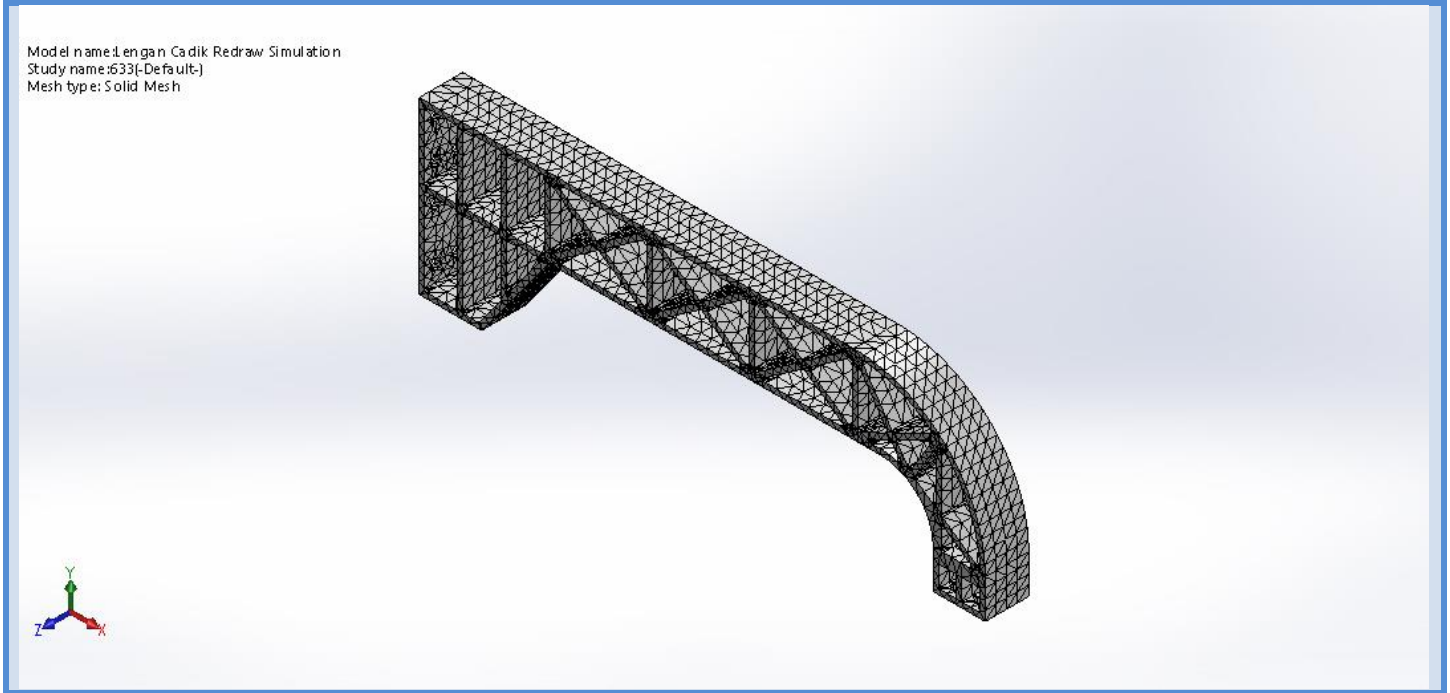
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 633.36 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	24.7297 mm
Tolerance	1.23649 mm
Mesh Quality Plot	High

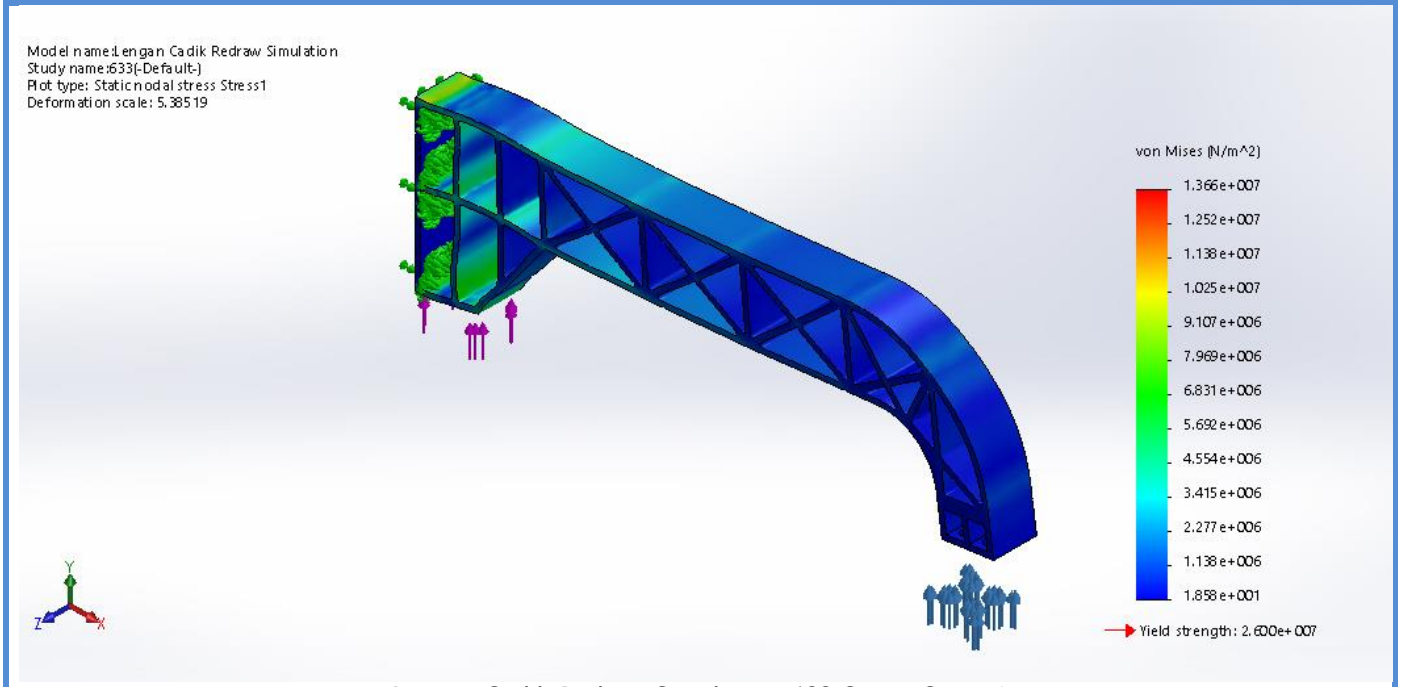
Mesh information - Details

Total Nodes	25275
Total Elements	12419
Maximum Aspect Ratio	17.573
% of elements with Aspect Ratio < 3	68.8
% of elements with Aspect Ratio > 10	0.467
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:03
Computer name:	



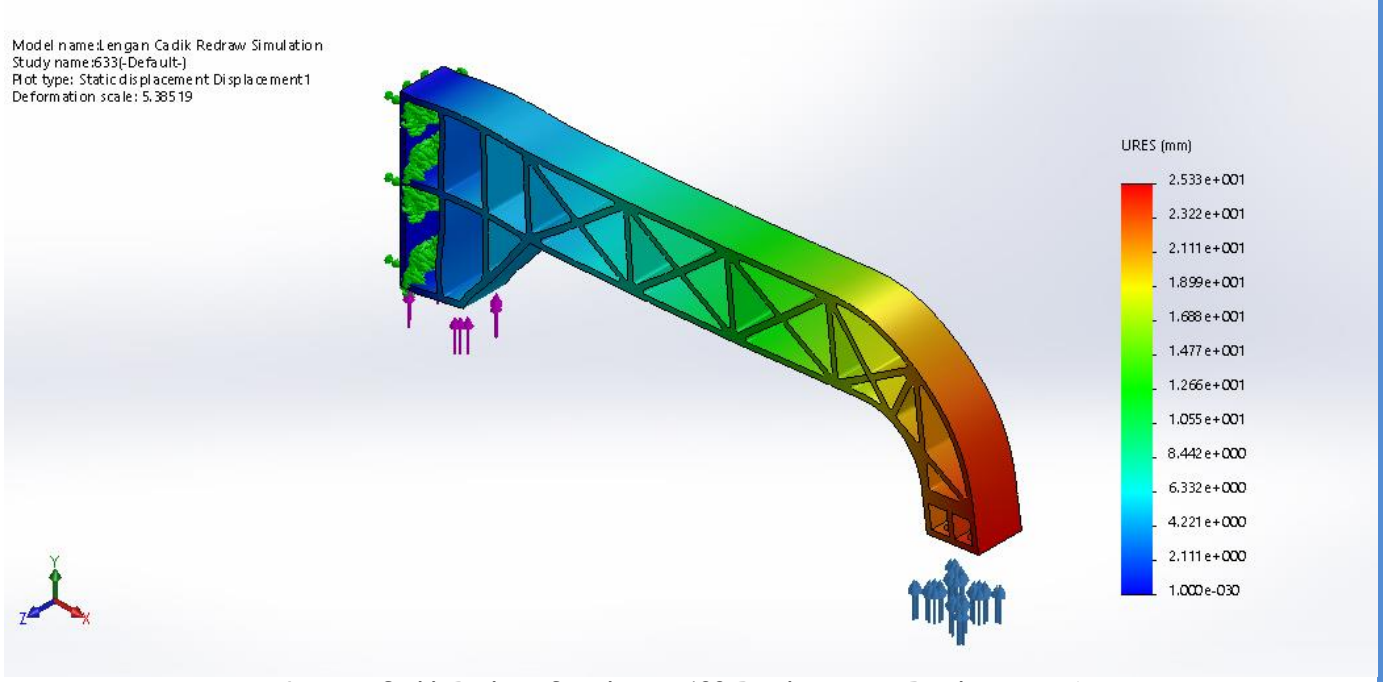
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	1.858e+001N/m^2 Node: 20799	1.366e+007N/m^2 Node: 19787



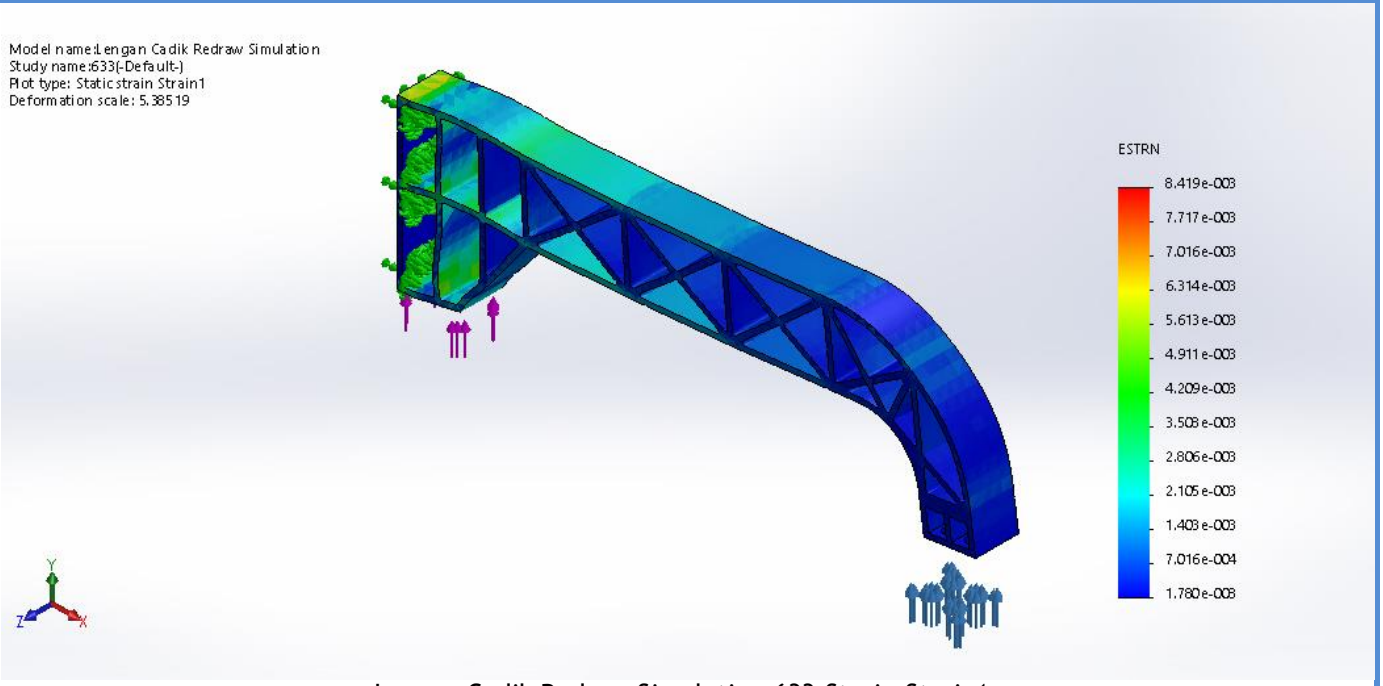
Lengan Cadik Redraw Simulation-633-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	2.533e+001mm Node: 2509



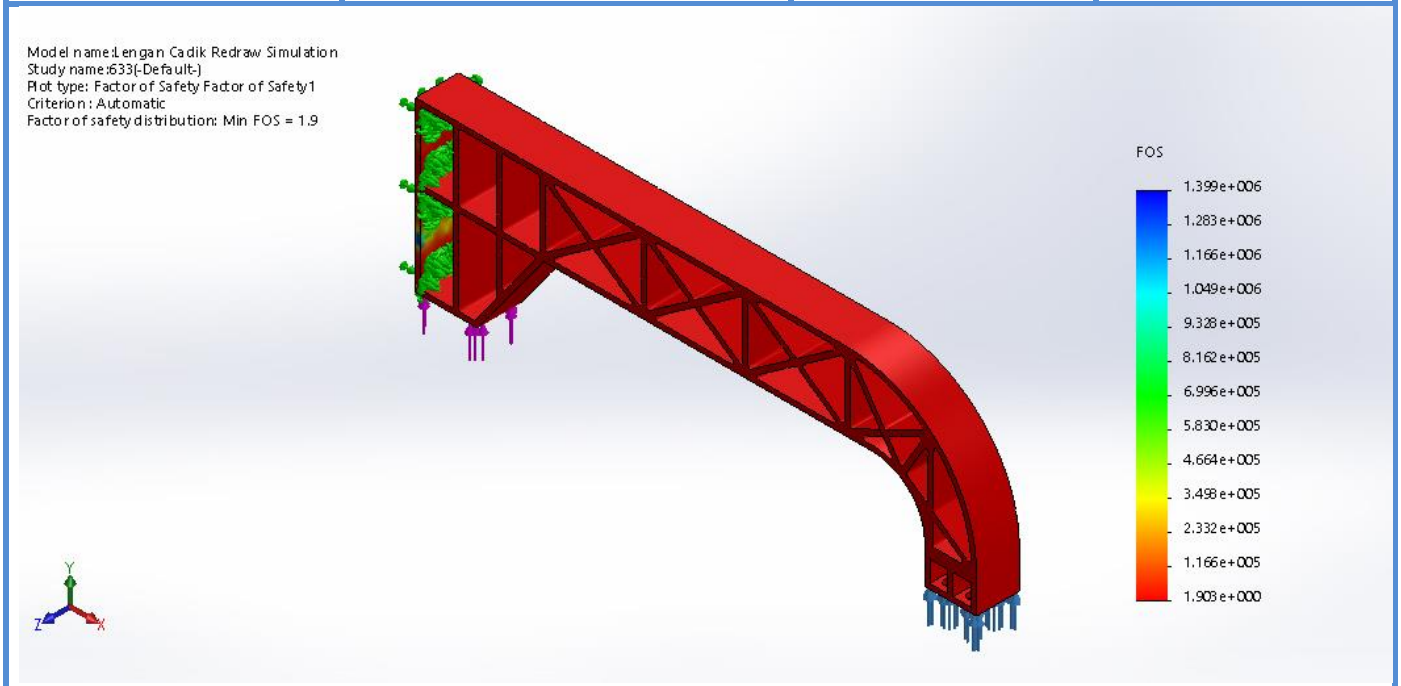
Lengan Cadik Redraw Simulation-633-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	1.780e-008 Element: 6108	8.419e-003 Element: 2573

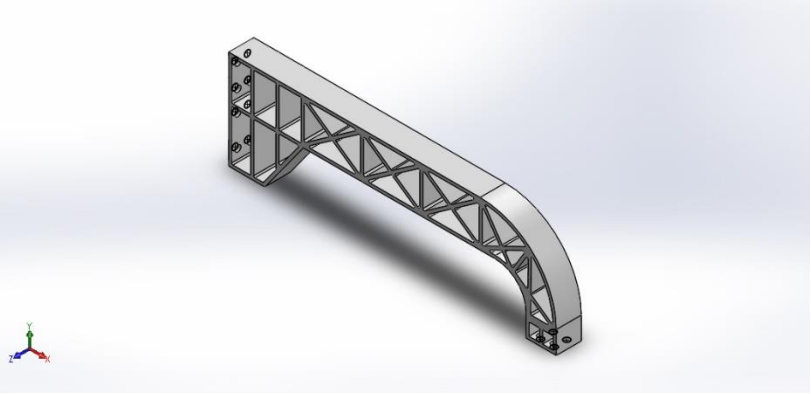


Lengan Cadik Redraw Simulation-633-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.903e+000 Node: 19787	1.399e+006 Node: 20799



Lengan Cadik Redraw Simulation-633-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik Redraw Simulation

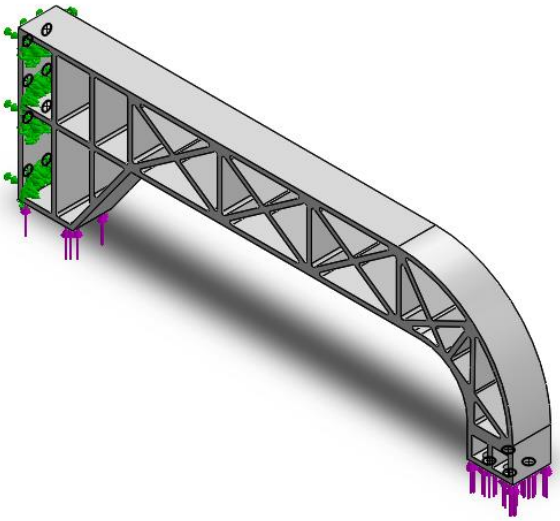
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 916
Analysis type: Static

Table of Contents

Description

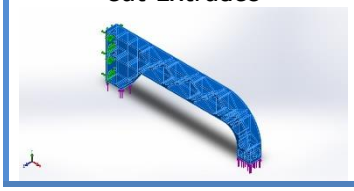
No Data

Model Information



Model name: Lengan Cadik Redraw Simulation
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude3 	Solid Body	**Mass:8.92401 kg** **Volume:0.00937397 m^3** **Density:952 kg/m^3** **Weight:87.4553 N**	**E:\Kuliah\SolidWorks\lbar\SolidWork\Lengan Cadik Redraw Simulation.SLDPRT** Jul 09 09:15:00 2018

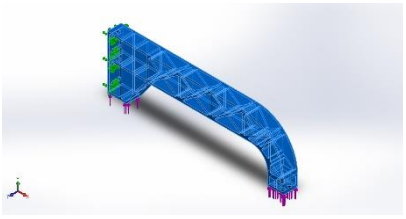
Study Properties

Study name	916
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\I bar\SolidWork)

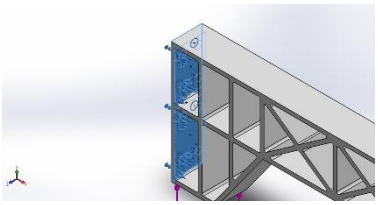
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

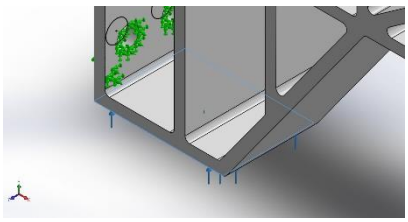
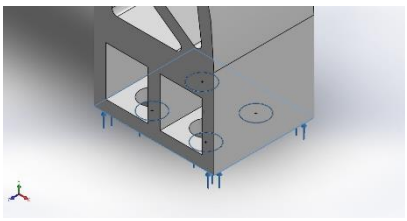
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude3)(Lengan Cadik Redraw Simulation)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-0.0948157	-3167	-0.346857	3167
Reaction Moment(N.m)	0	0	0	0

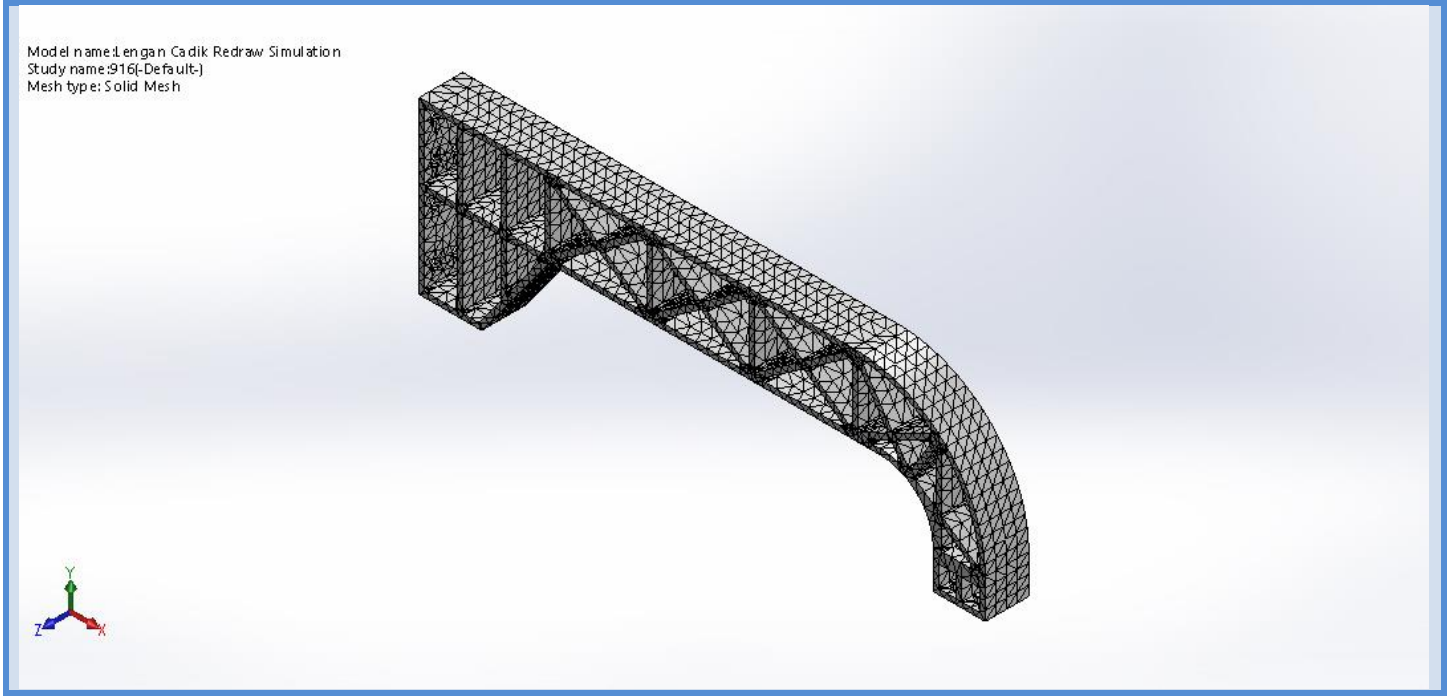
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 916.04 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	24.7297 mm
Tolerance	1.23649 mm
Mesh Quality Plot	High

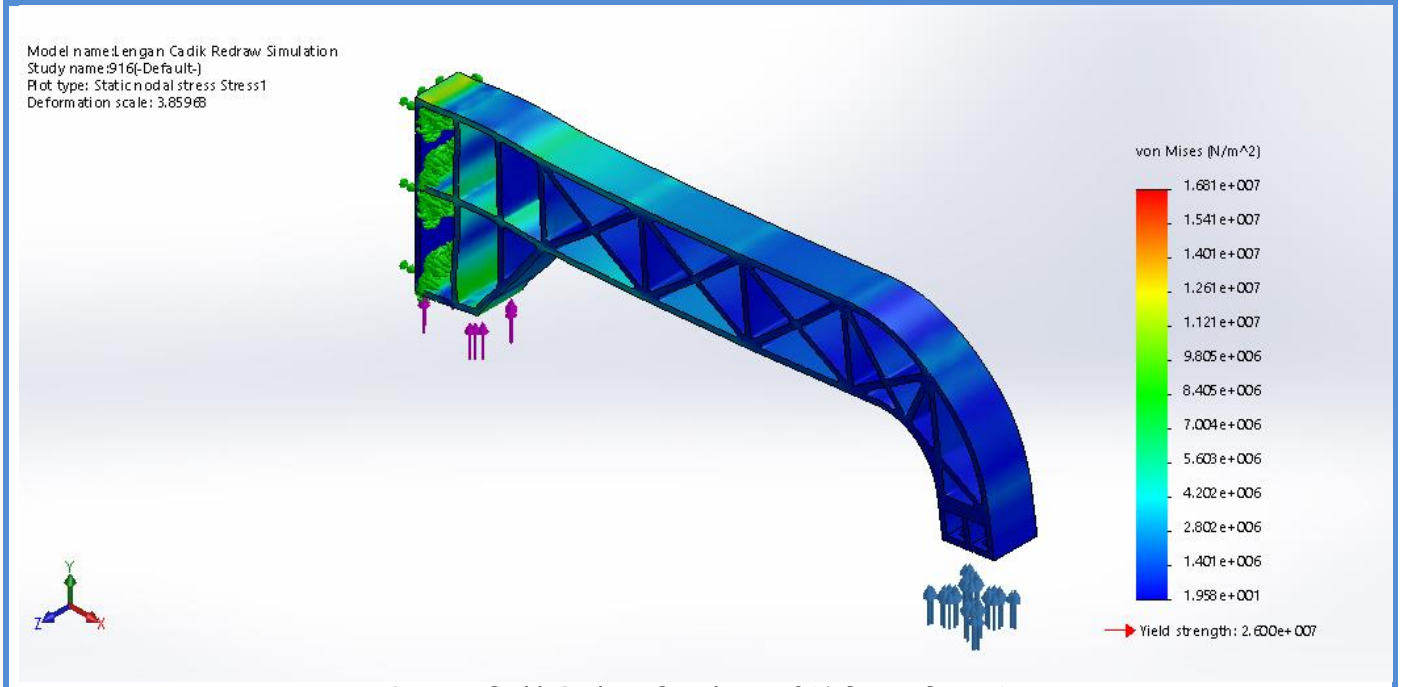
Mesh information - Details

Total Nodes	25275
Total Elements	12419
Maximum Aspect Ratio	17.573
% of elements with Aspect Ratio < 3	68.8
% of elements with Aspect Ratio > 10	0.467
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:05
Computer name:	



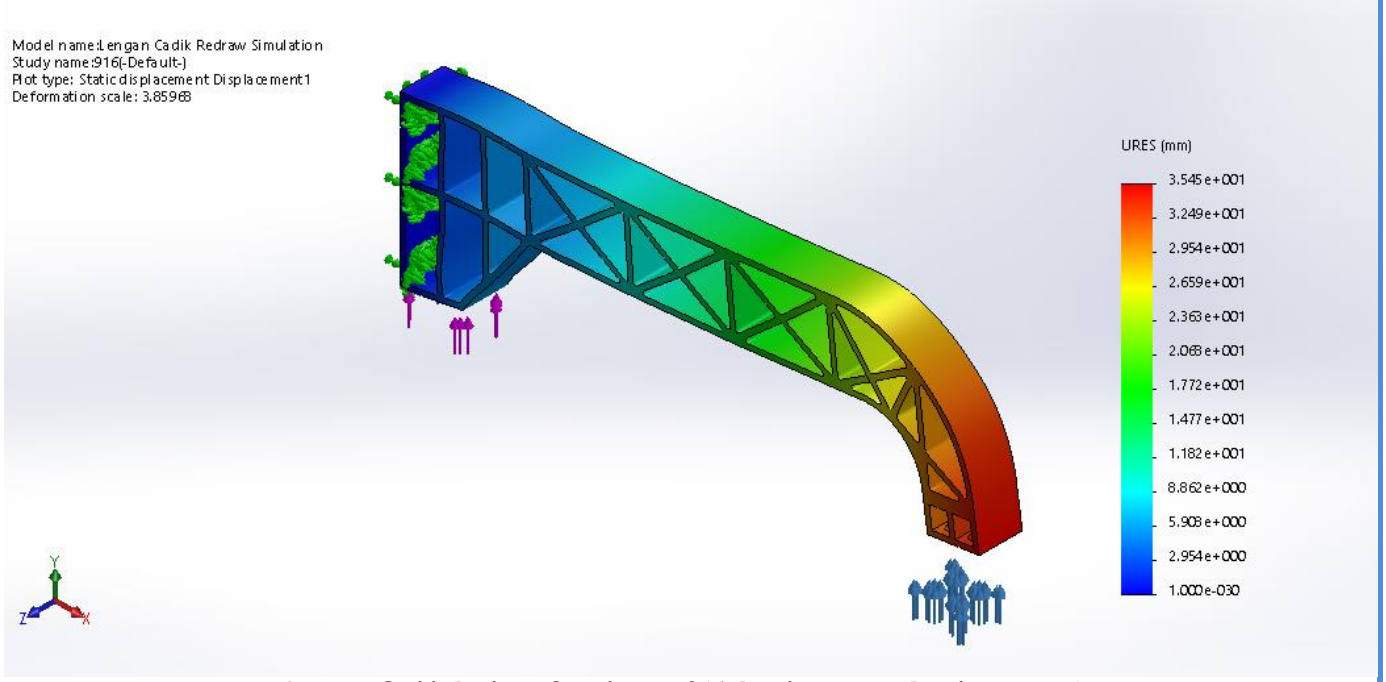
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	1.958e+001N/m^2 Node: 15562	1.681e+007N/m^2 Node: 19787



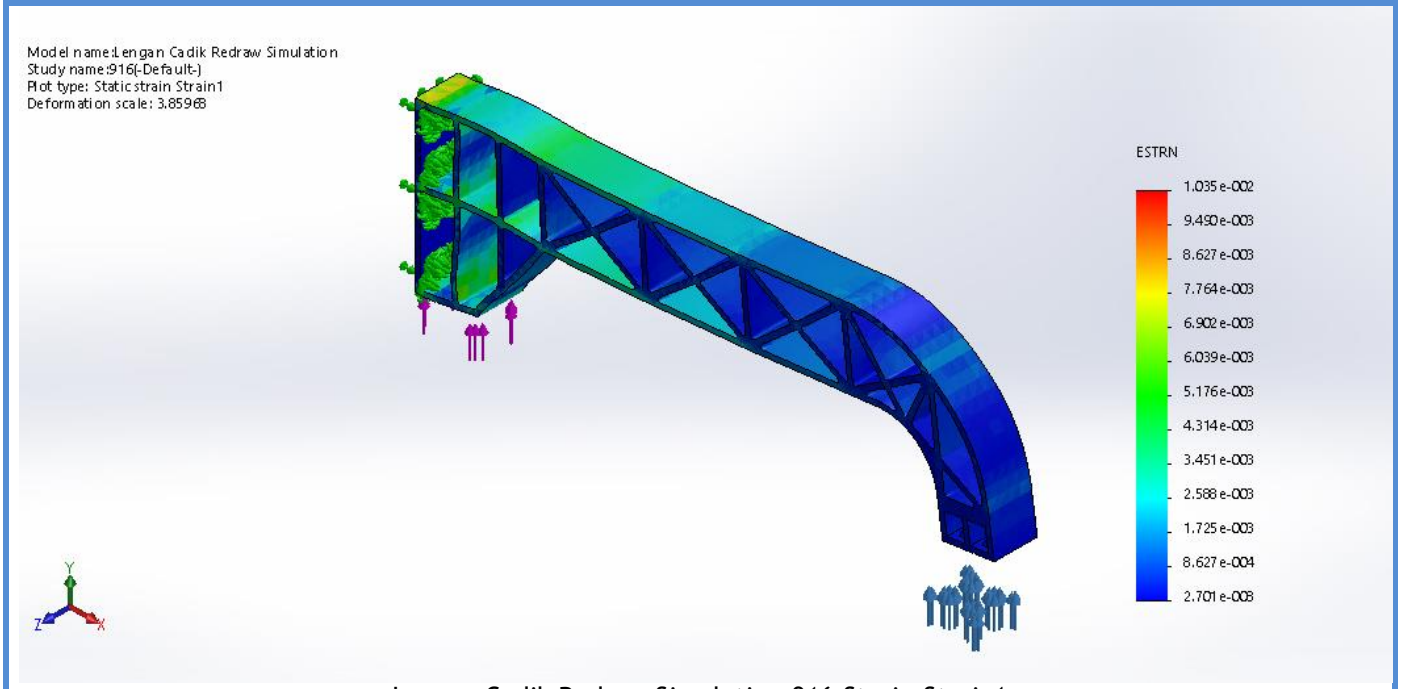
Lengan Cadik Redraw Simulation-916-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	3.545e+001mm Node: 2509



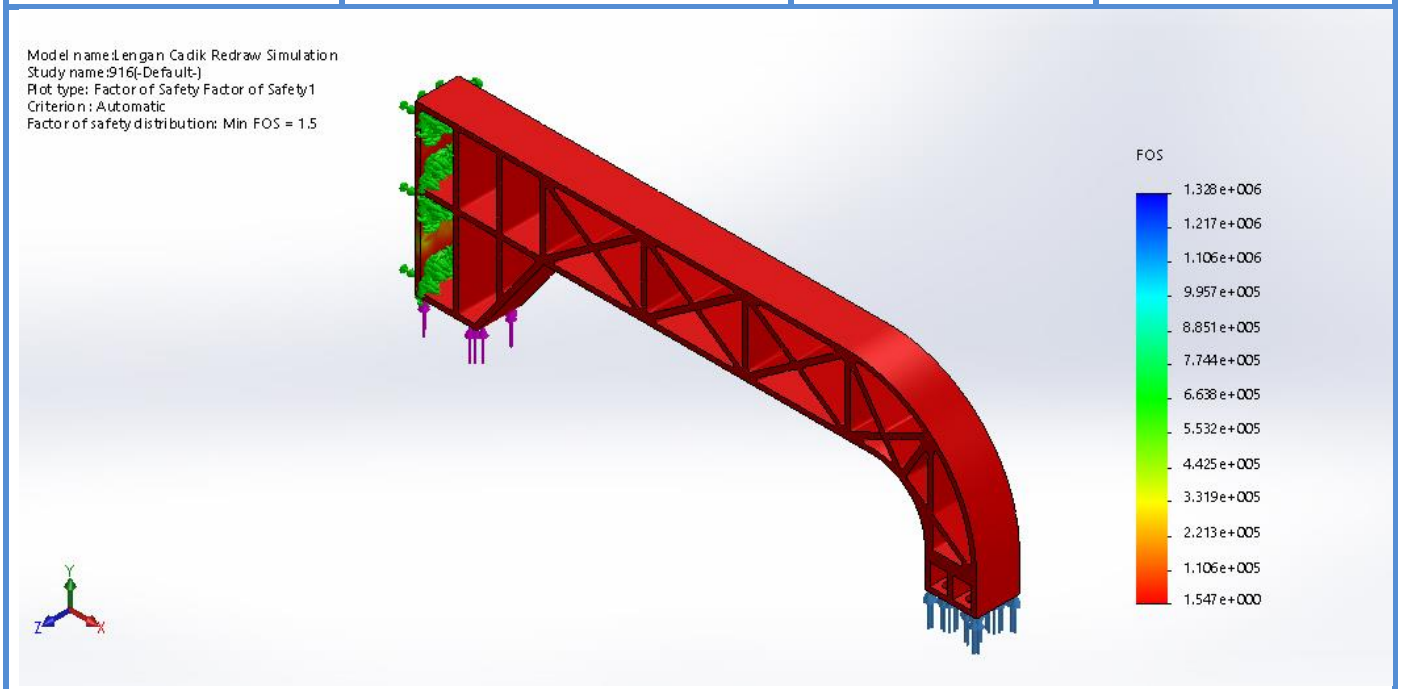
Lengan Cadik Redraw Simulation-916-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	2.701e-008 Element: 6108	1.035e-002 Element: 2573

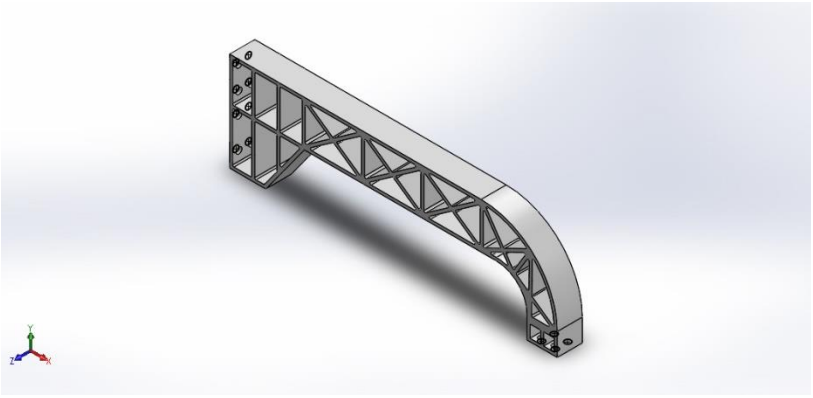


Lengan Cadik Redraw Simulation-916-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.547e+000 Node: 19787	1.328e+006 Node: 15562



Lengan Cadik Redraw Simulation-916-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik Redraw Simulation

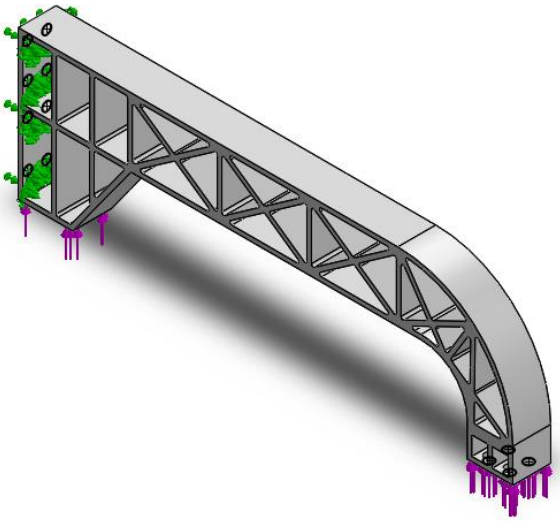
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 1213
Analysis type: Static

Table of Contents

Description

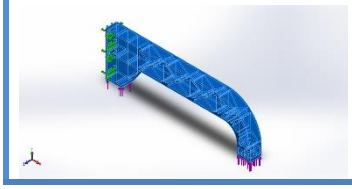
No Data

Model Information



Model name: Lengan Cadik Redraw Simulation
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude3 	Solid Body	**Mass:8.92401 kg** **Volume:0.00937397 m^3** **Density:952 kg/m^3** **Weight:87.4553 N**	**E:\Kuliah\SolidWorks\lbar\SolidWork\Lengan Cadik Redraw Simulation.SLDPRT** Jul 09 09:15:00 2018

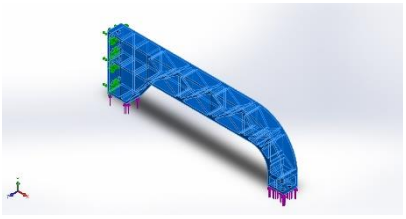
Study Properties

Study name	1213
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	On
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\Autocad)

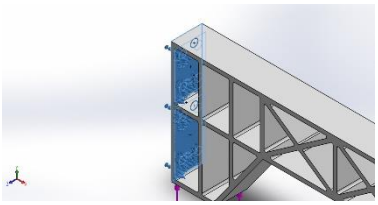
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

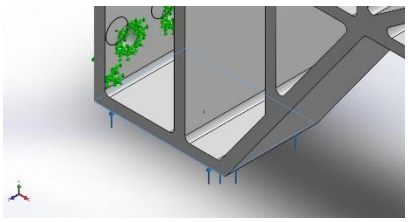
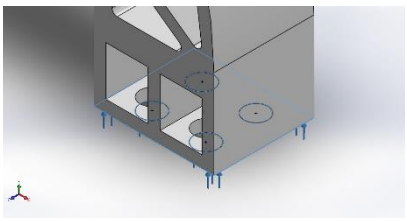
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude3)(Lengan Cadik Redraw Simulation)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	0.317873	-3463.74	0.530553	3463.74
Reaction Moment(N.m)	0	0	0	0

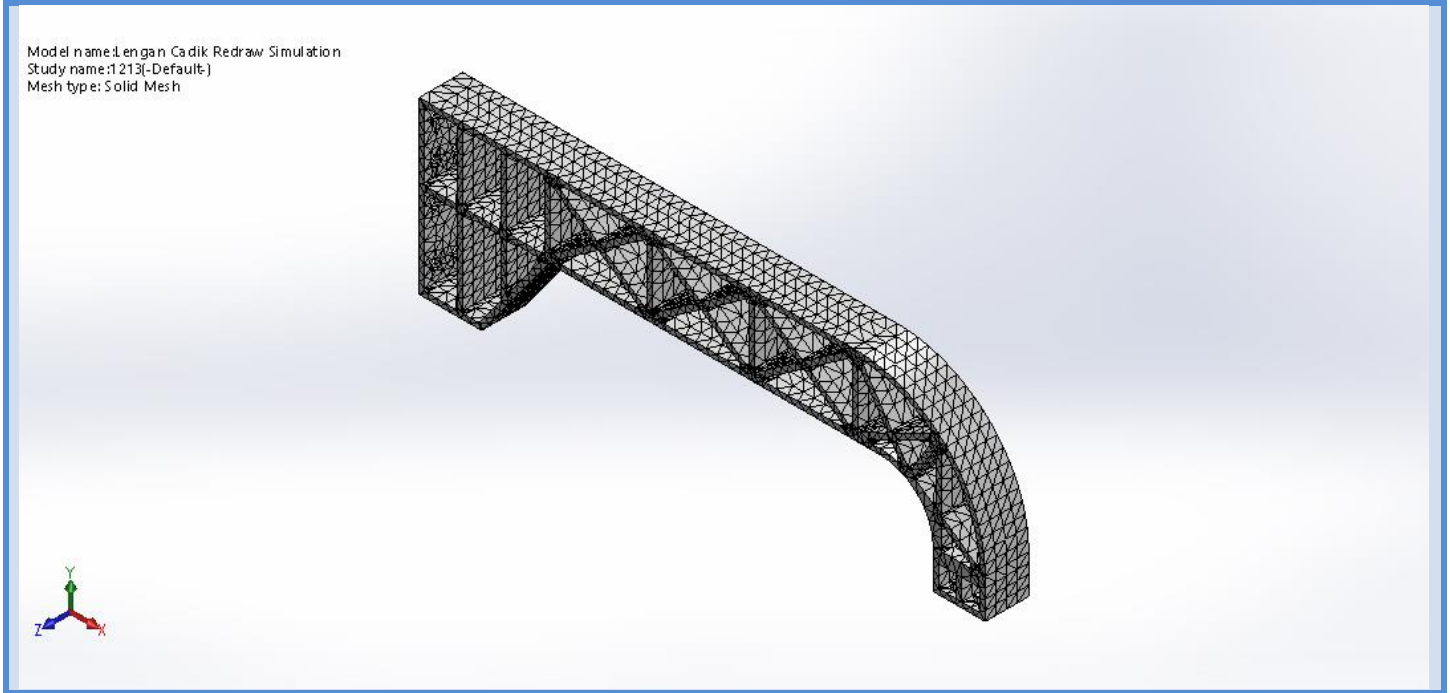
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 1213.18 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	24.7297 mm
Tolerance	1.23649 mm
Mesh Quality Plot	High

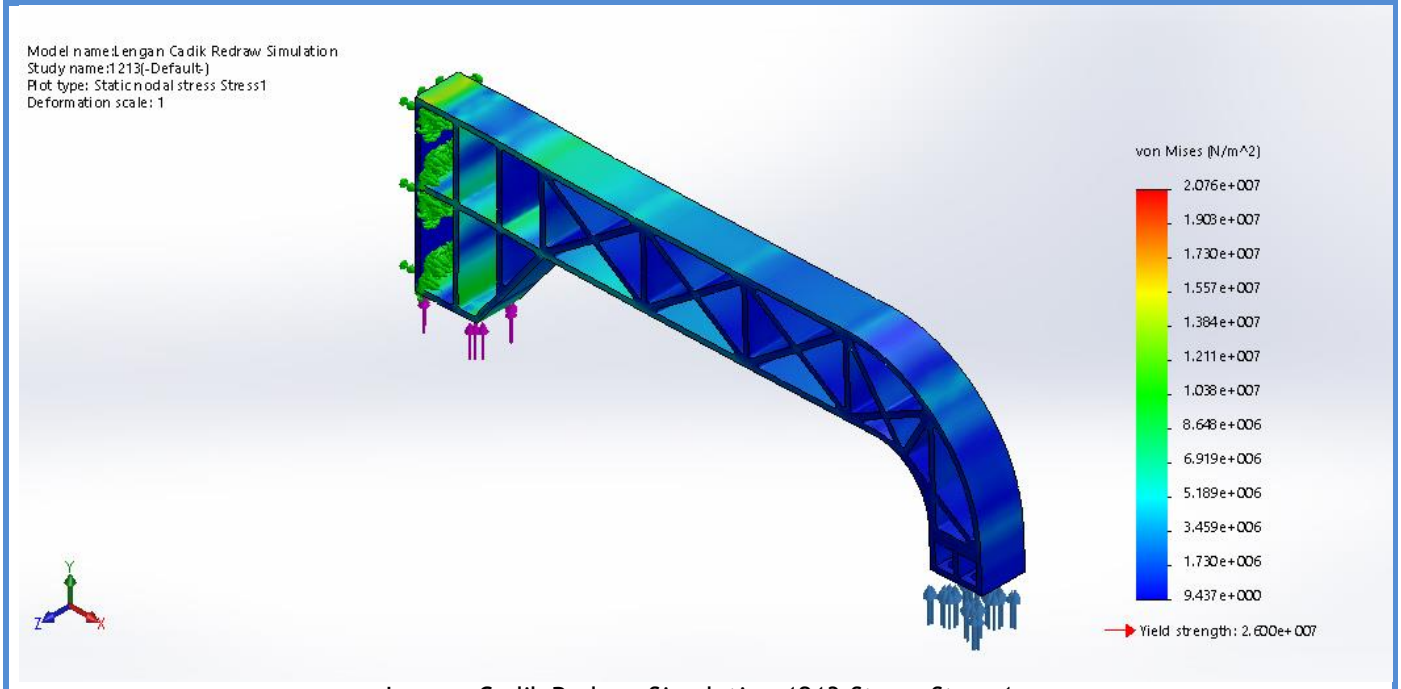
Mesh information - Details

Total Nodes	25275
Total Elements	12419
Maximum Aspect Ratio	17.573
% of elements with Aspect Ratio < 3	68.8
% of elements with Aspect Ratio > 10	0.467
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



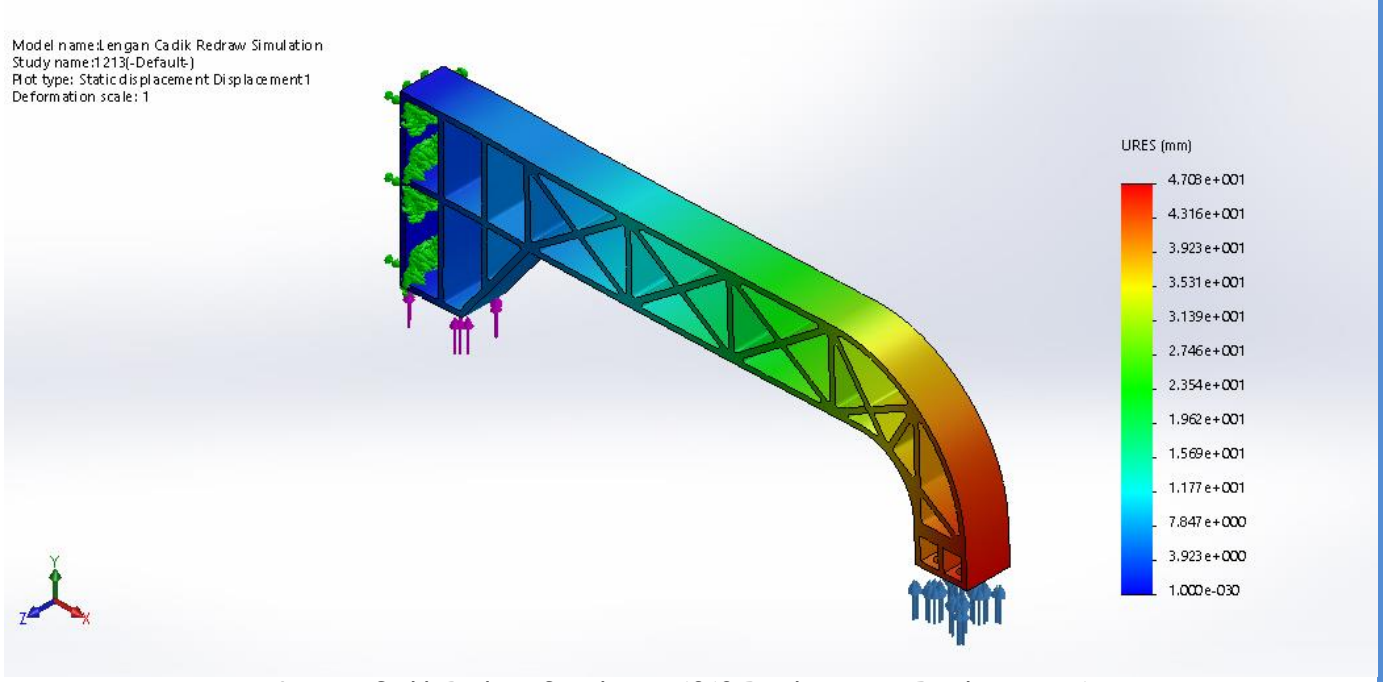
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	9.437e+000N/m^2 Node: 15423	2.076e+007N/m^2 Node: 19787



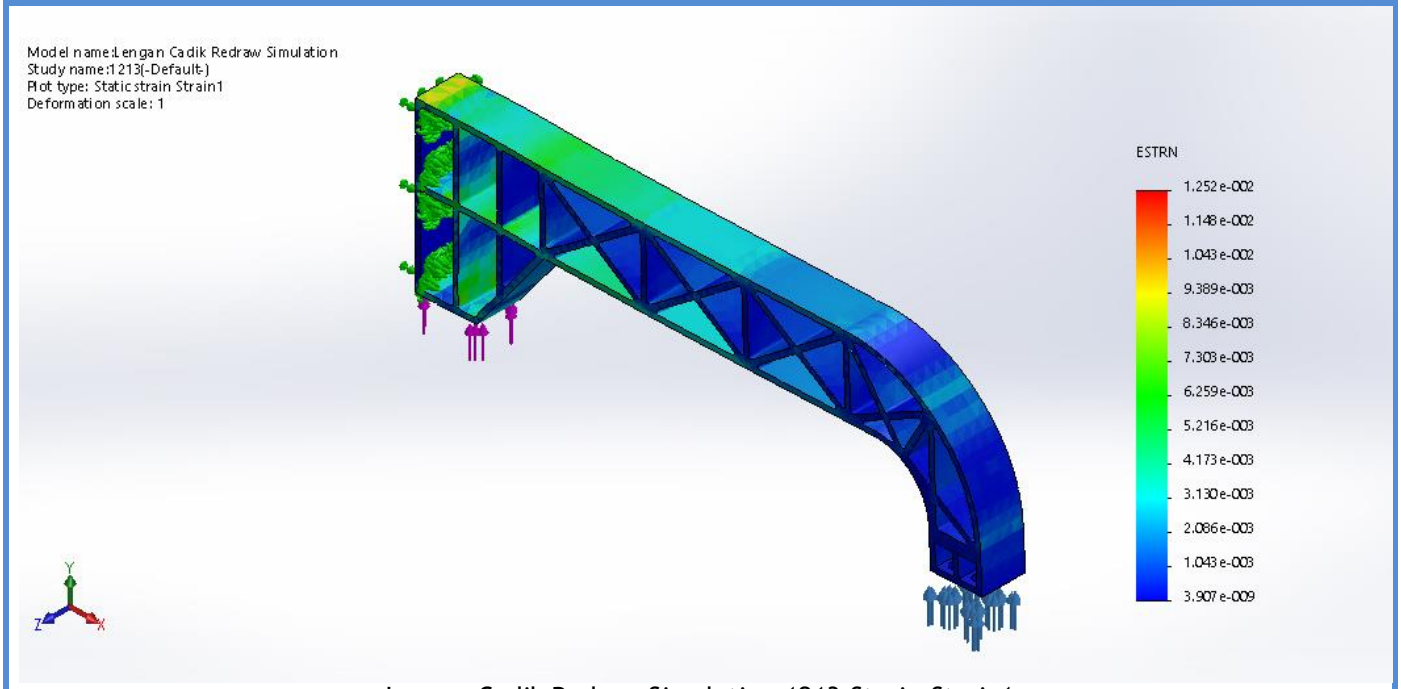
Lengan Cadik Redraw Simulation-1213-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	4.708e+001mm Node: 2509



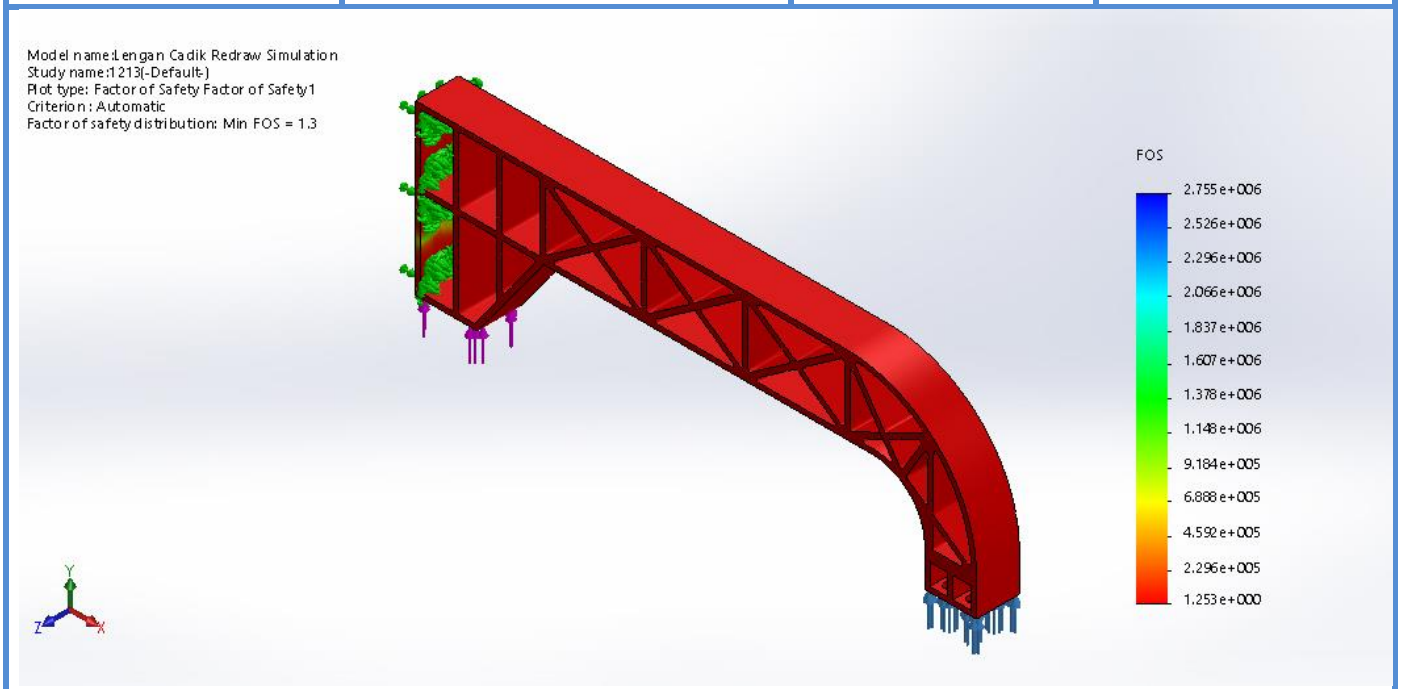
Lengan Cadik Redraw Simulation-1213-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	3.907e-009 Element: 6620	1.252e-002 Element: 2573

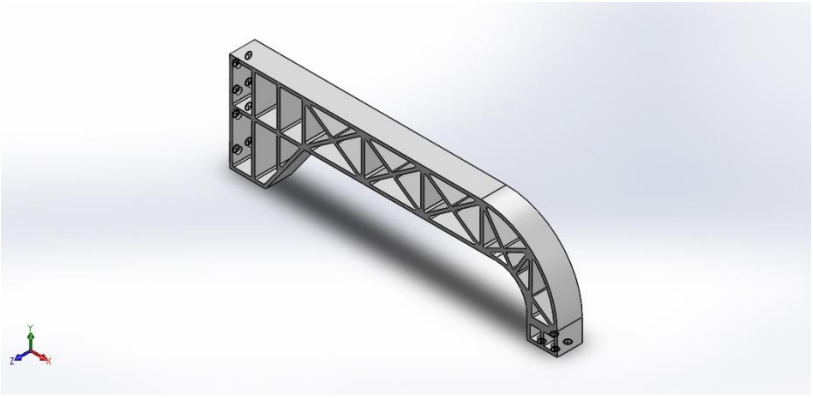


Lengan Cadik Redraw Simulation-1213-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.253e+000 Node: 19787	2.755e+006 Node: 15423



Lengan Cadik Redraw Simulation-1213-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik Redraw Simulation

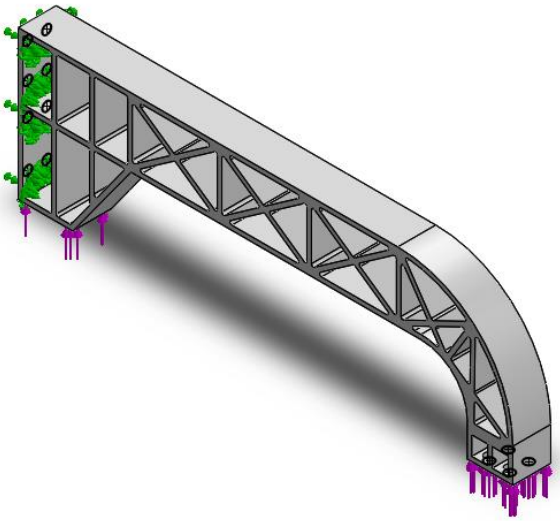
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 1482
Analysis type: Static

Table of Contents

Description

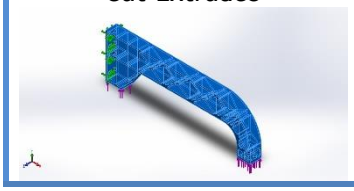
No Data

Model Information



Model name: Lengan Cadik Redraw Simulation
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude3 	Solid Body	**Mass:8.92401 kg** **Volume:0.00937397 m^3** **Density:952 kg/m^3** **Weight:87.4553 N**	**E:\Kuliah\SolidWorks\lbar\SolidWork\Lengan Cadik Redraw Simulation.SLDPRT** Jul 09 09:15:00 2018

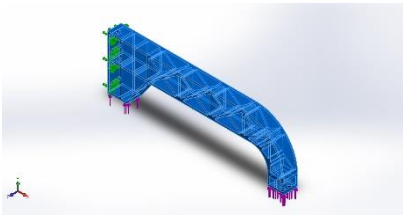
Study Properties

Study name	1482
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	On
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\I bar\SolidWork)

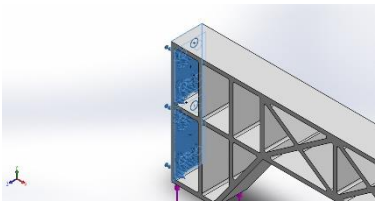
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

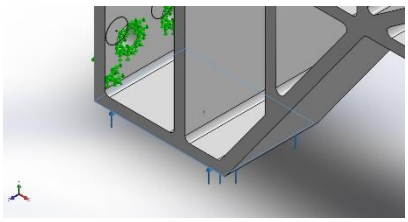
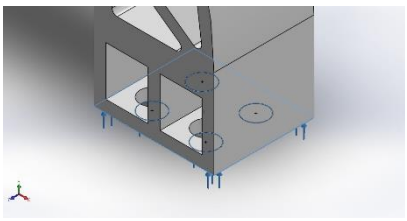
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude3)(Lengan Cadik Redraw Simulation)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	0.0465422	-3732.73	-0.157679	3732.73
Reaction Moment(N.m)	0	0	0	0

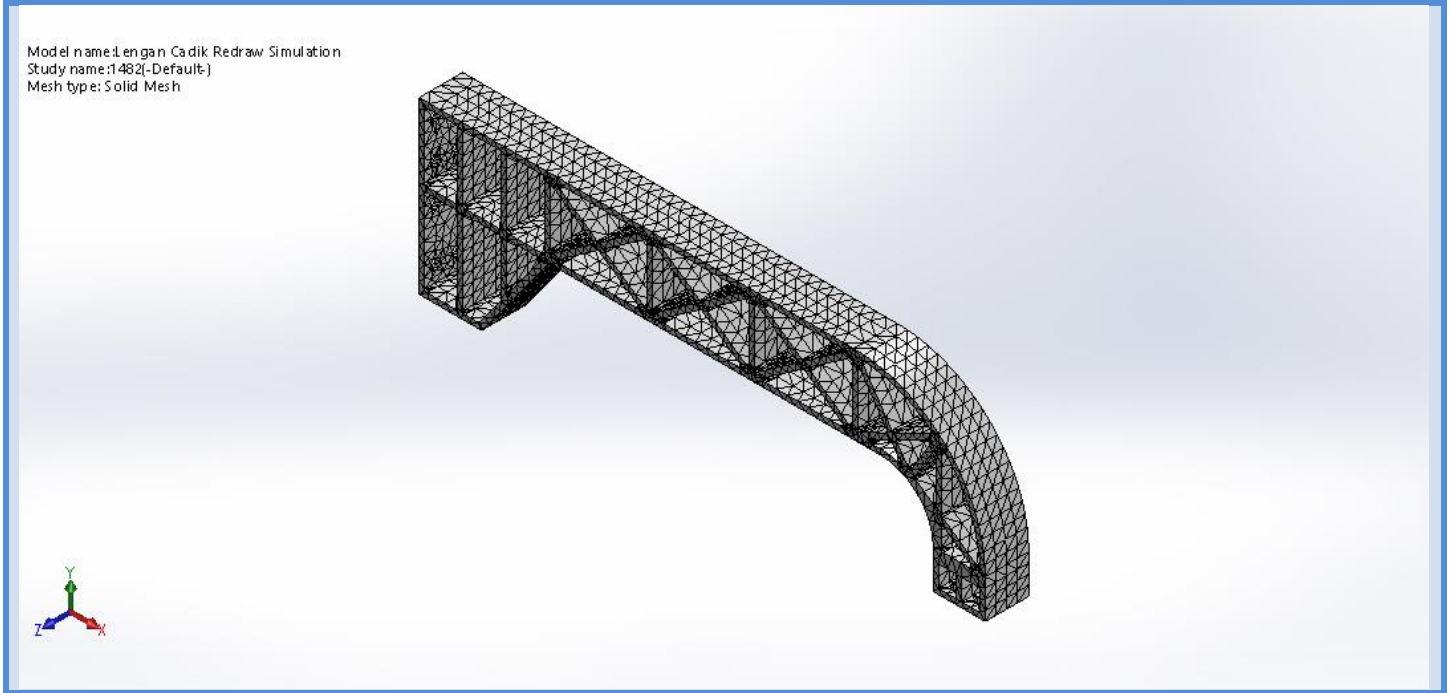
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 1482.27 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	24.7297 mm
Tolerance	1.23649 mm
Mesh Quality Plot	High

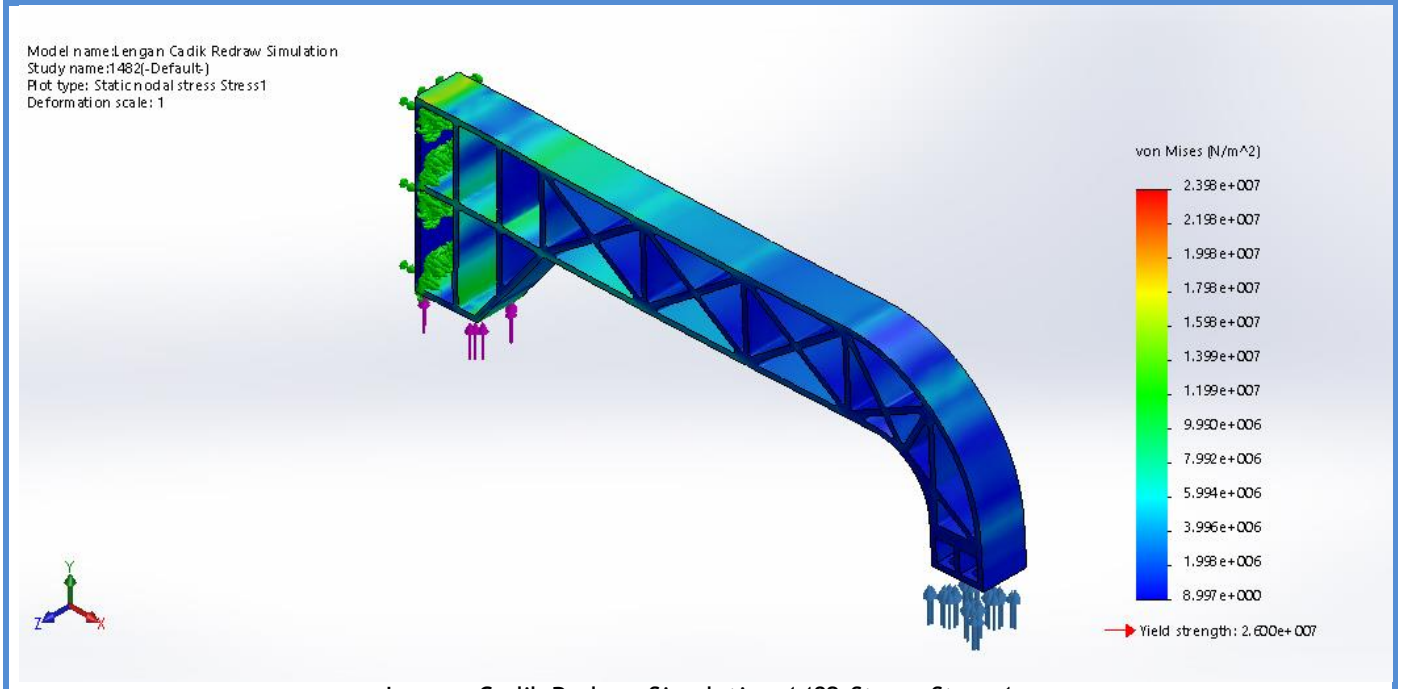
Mesh information - Details

Total Nodes	25275
Total Elements	12419
Maximum Aspect Ratio	17.573
% of elements with Aspect Ratio < 3	68.8
% of elements with Aspect Ratio > 10	0.467
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:05
Computer name:	



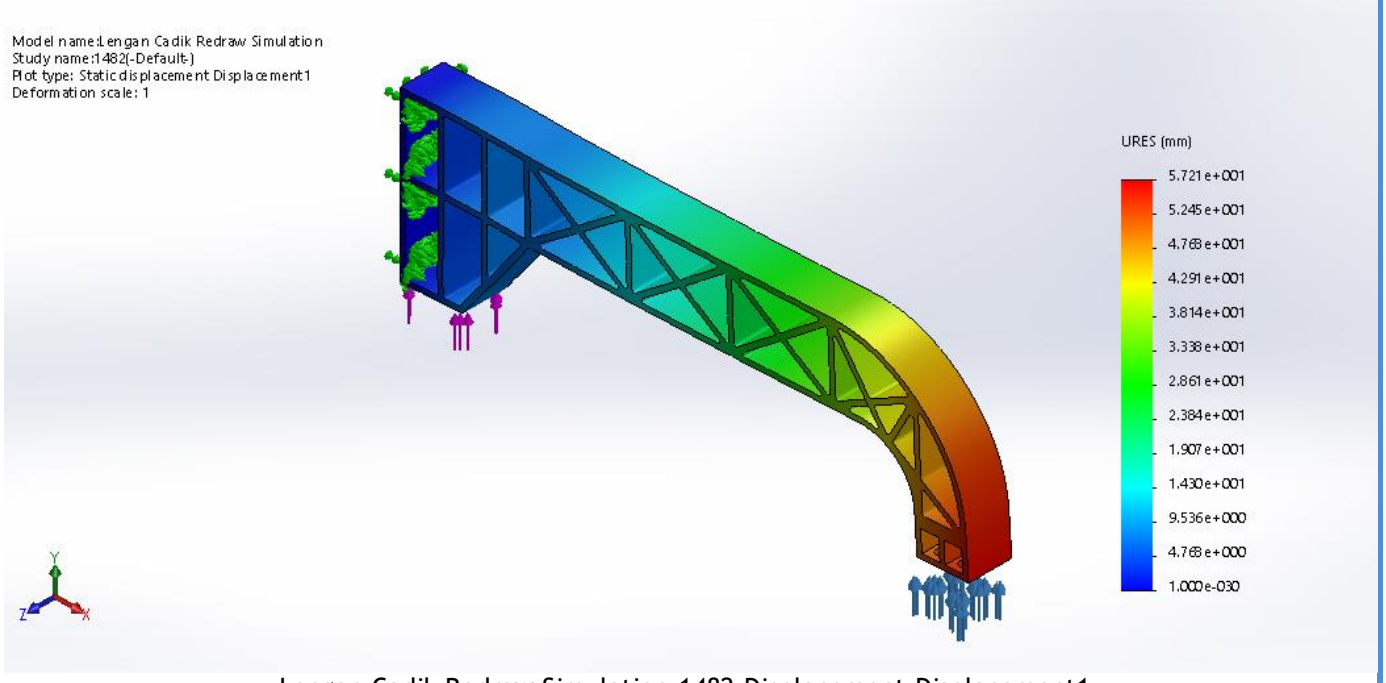
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	8.997e+000N/m^2 Node: 12617	2.398e+007N/m^2 Node: 19787



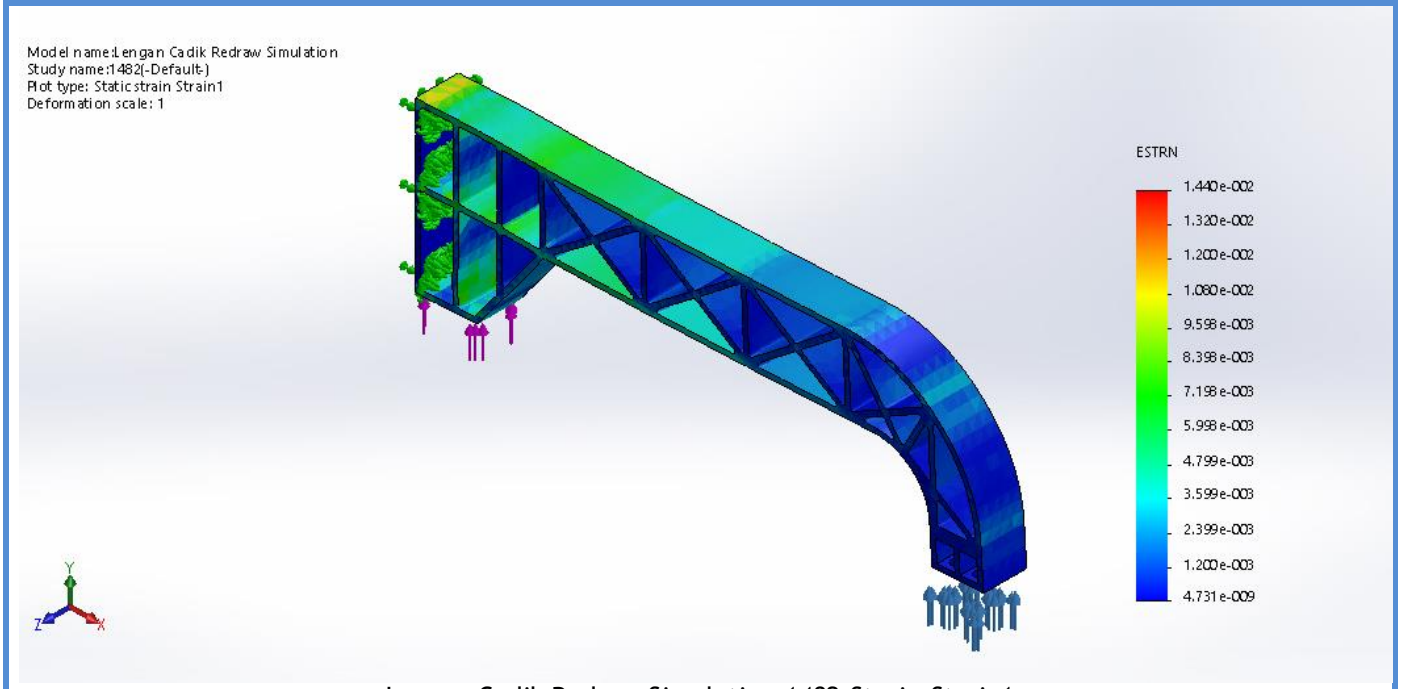
Lengan Cadik Redraw Simulation-1482-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	5.721e+001mm Node: 2509



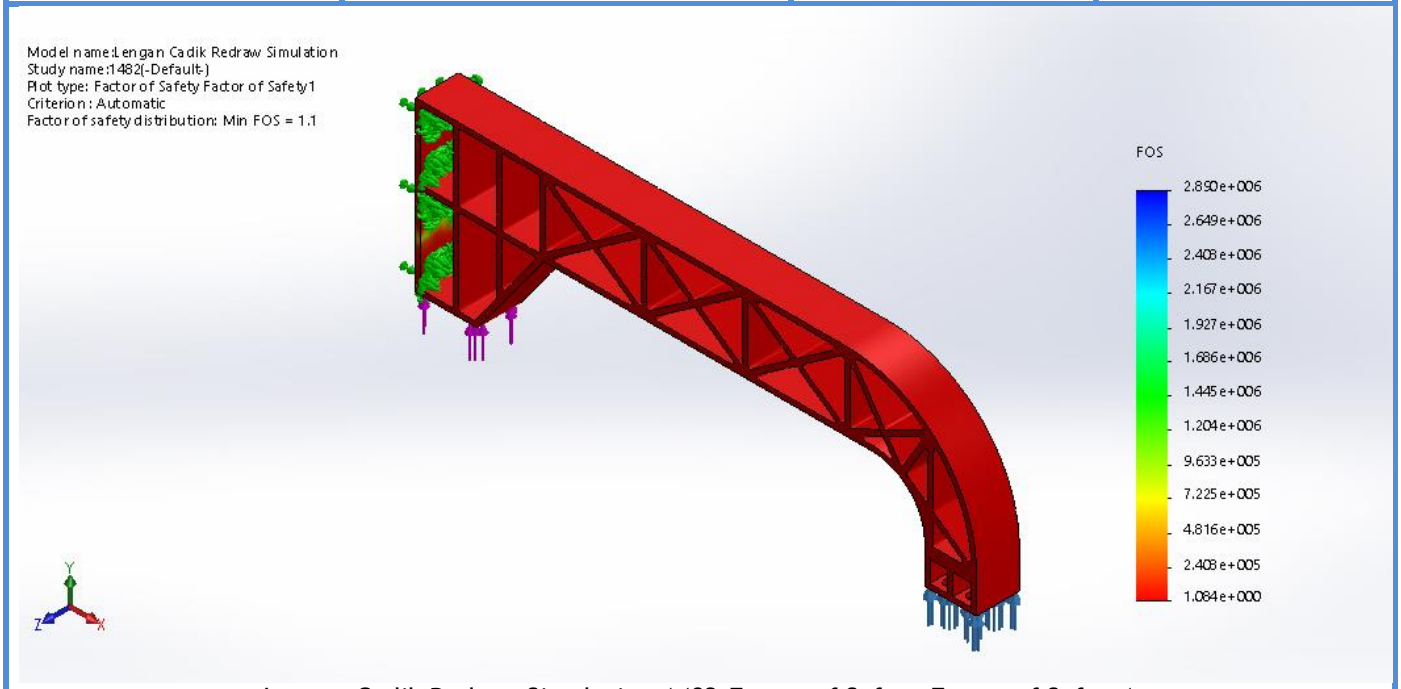
Lengan Cadik Redraw Simulation-1482-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	4.731e-009 Element: 6620	1.440e-002 Element: 2573

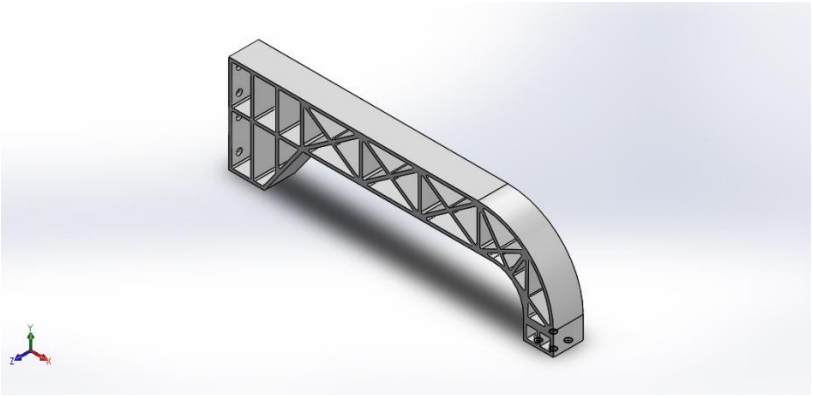


Lengan Cadik Redraw Simulation-1482-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.084e+000 Node: 19787	2.890e+006 Node: 12617



Lengan Cadik Redraw Simulation-1482-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (120 mm)

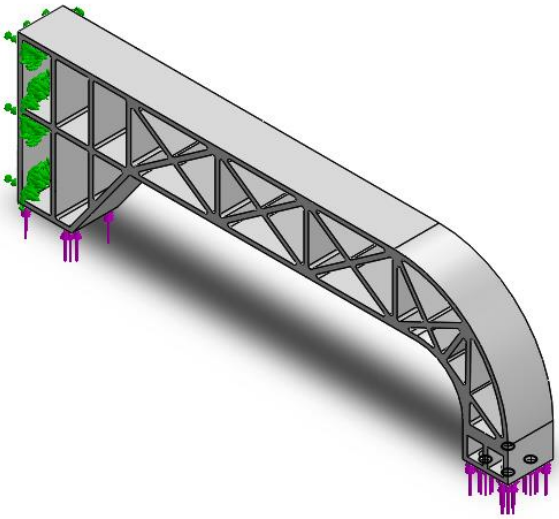
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 133
Analysis type: Static

Table of Contents

Description

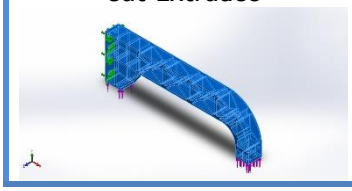
No Data

Model Information



Model name: Lengan Cadik (120 mm)
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude8 	Solid Body	**Mass:10.7214 kg** **Volume:0.011262 m^3** **Density:952 kg/m^3** **Weight:105.07 N**	**E:\Kuliah\SolidWorks\lbar\SolidWork\Lengan Cadik (120 mm).SLDPRT** Jul 09 09:29:23 2018

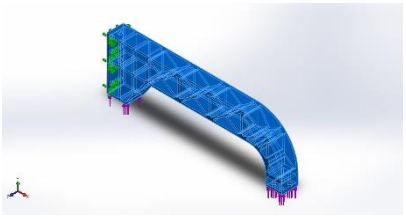
Study Properties

Study name	133
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\I bar\SolidWork)

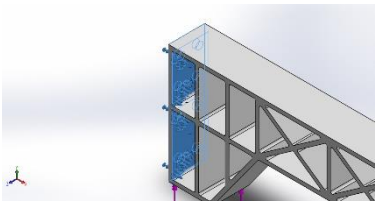
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

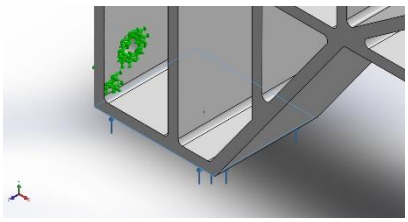
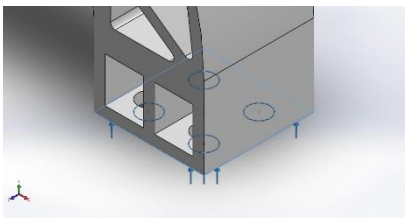
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude8)(Lengan Cadik (120 mm))
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	4.02778	-2385.25	-0.62858	2385.25
Reaction Moment(N.m)	0	0	0	0

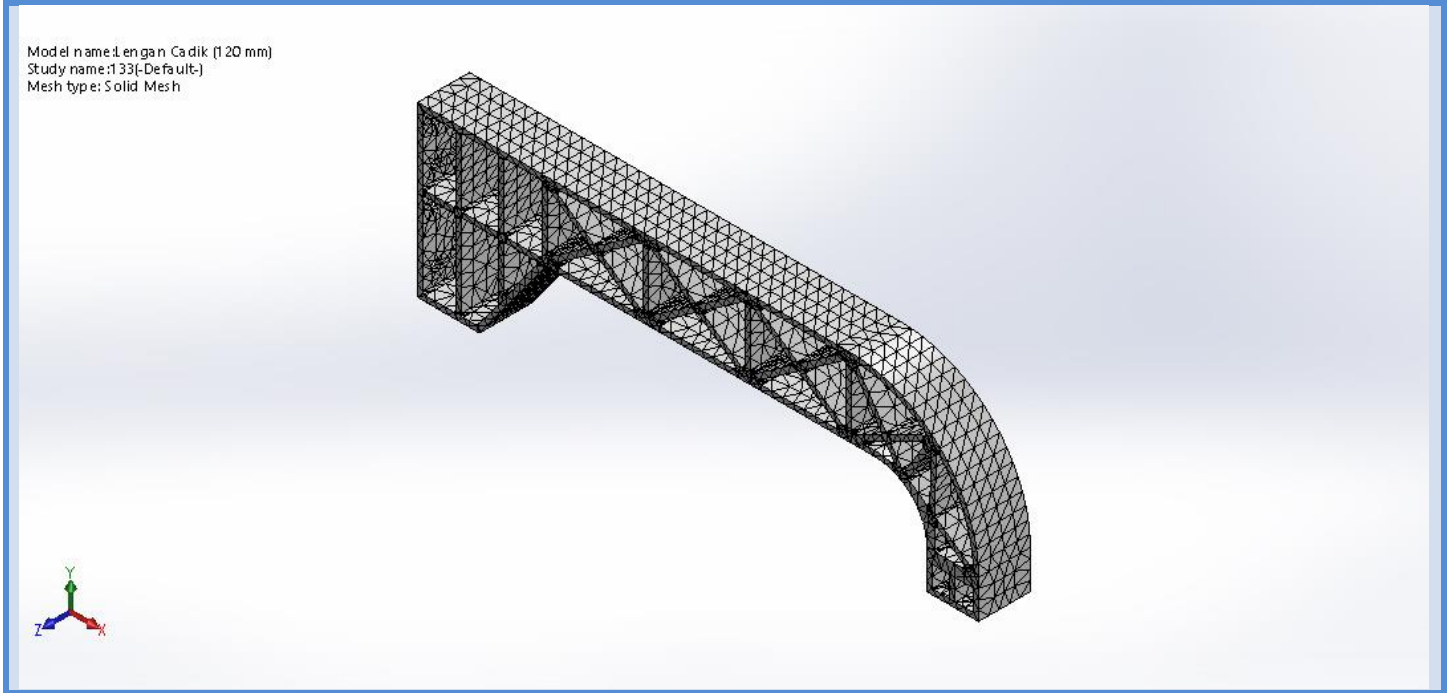
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 133.55 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	26.8096 mm
Tolerance	1.34048 mm
Mesh Quality Plot	High

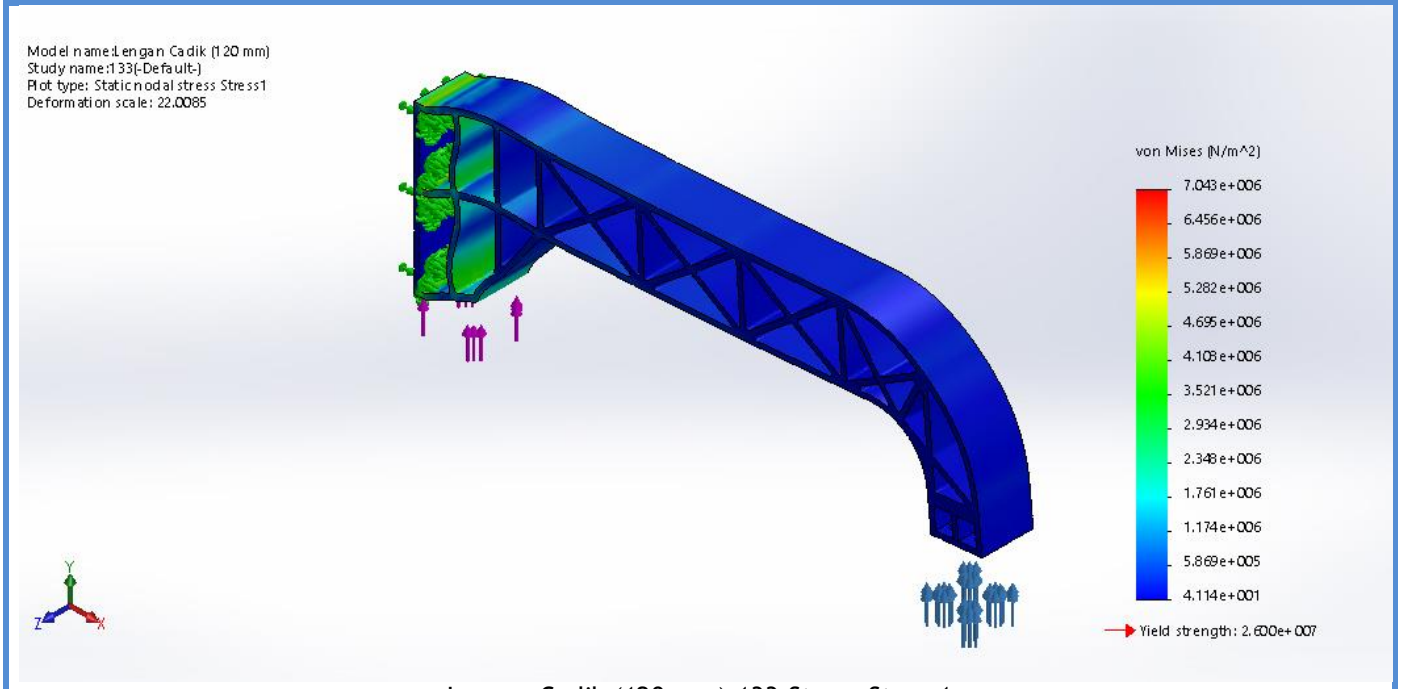
Mesh information - Details

Total Nodes	26216
Total Elements	13004
Maximum Aspect Ratio	20.88
% of elements with Aspect Ratio < 3	65.1
% of elements with Aspect Ratio > 10	0.461
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



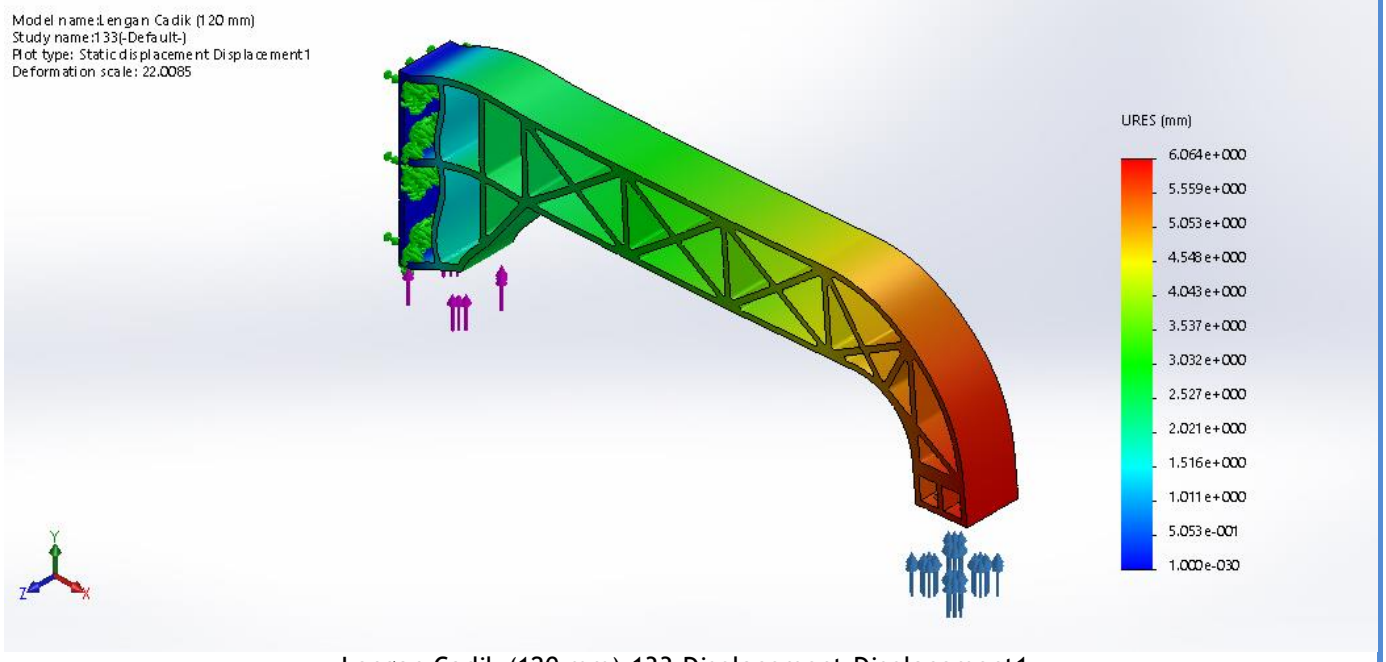
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	4.114e+001N/m^2 Node: 13155	7.043e+006N/m^2 Node: 16188



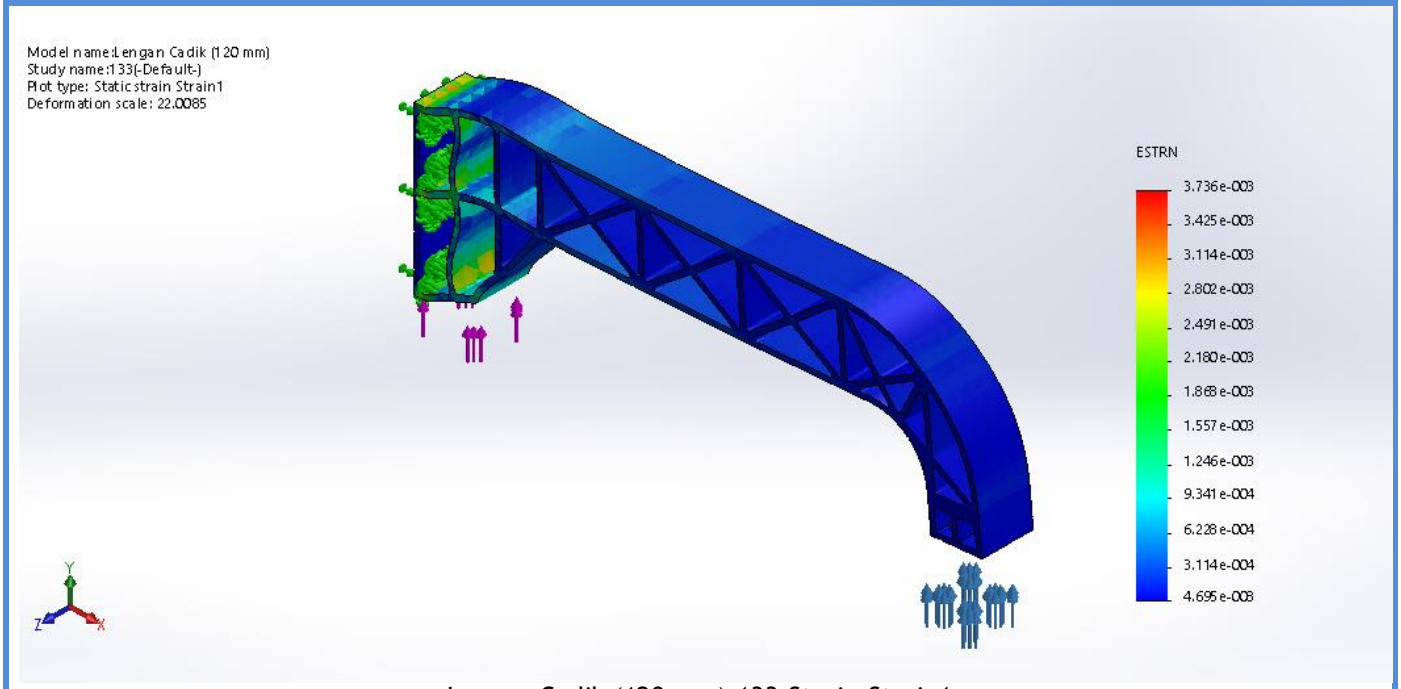
Lengan Cadik (120 mm)-133-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	6.064e+000mm Node: 11915



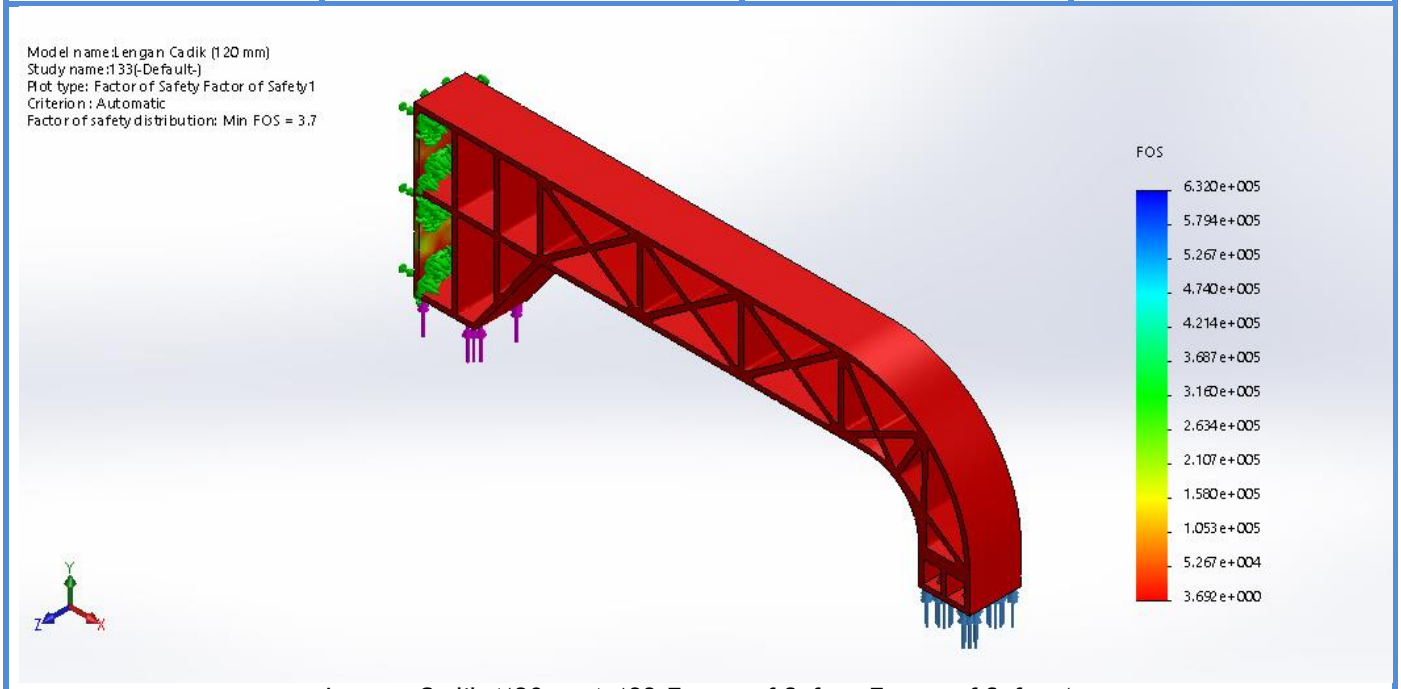
Lengan Cadik (120 mm)-133-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	4.695e-008 Element: 10149	3.736e-003 Element: 10627

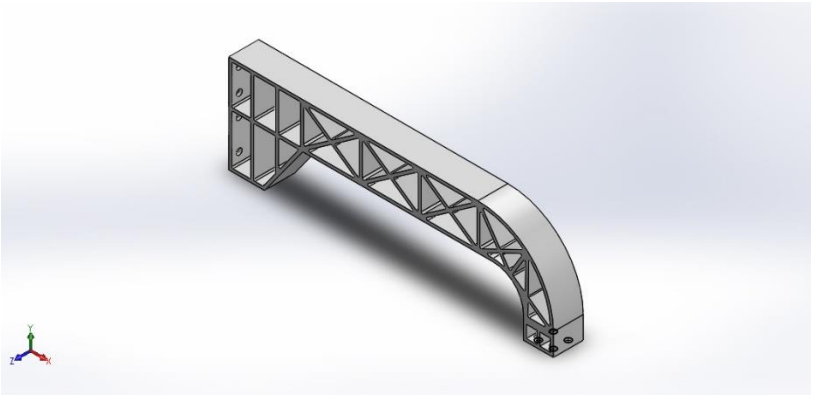


Lengan Cadik (120 mm)-133-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	3.692e+000 Node: 16188	6.320e+005 Node: 13155



Lengan Cadik (120 mm)-133-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (120 mm)

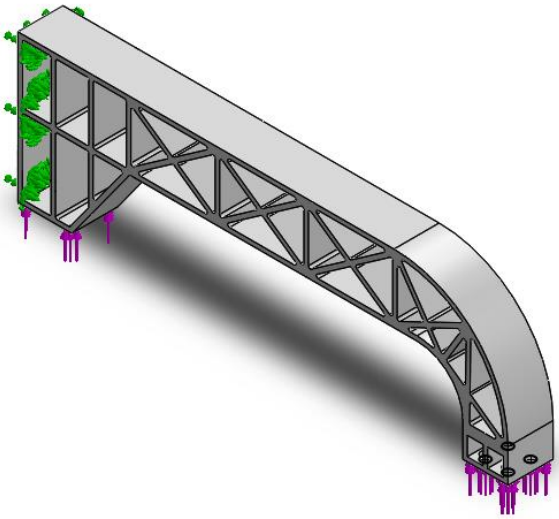
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 361
Analysis type: Static

Table of Contents

Description

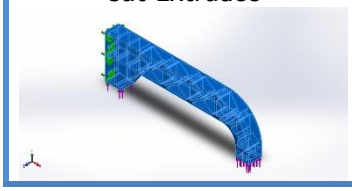
No Data

Model Information



Model name: Lengan Cadik (120 mm)
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude8 	Solid Body	**Mass:10.7214 kg** **Volume:0.011262 m^3** **Density:952 kg/m^3** **Weight:105.07 N**	**E:\Kuliah\SolidWorks\lbar\SolidWork\Lengan Cadik (120 mm).SLDPRT** Jul 09 09:29:23 2018

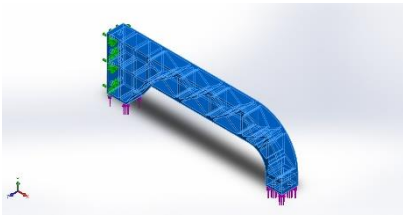
Study Properties

Study name	361
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\I bar\SolidWork)

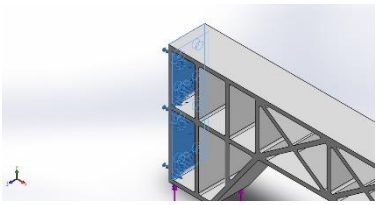
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

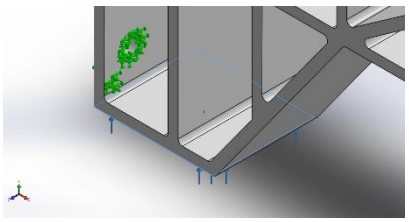
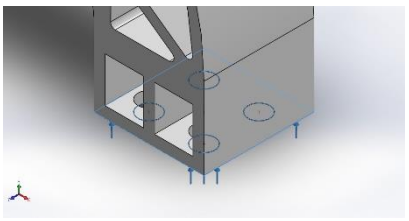
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude8)(Lengan Cadik (120 mm))
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-1.14733	-2611.71	-0.719438	2611.71
Reaction Moment(N.m)	0	0	0	0

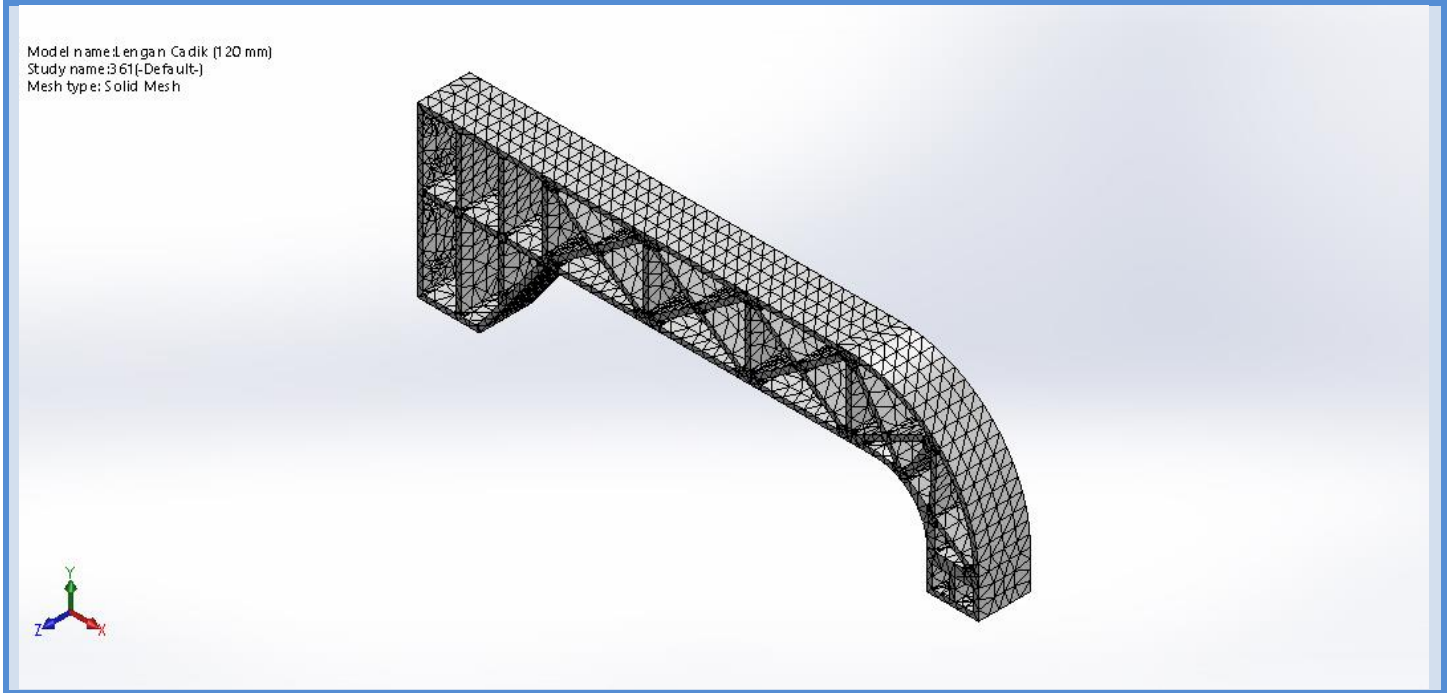
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 361.76 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	26.8096 mm
Tolerance	1.34048 mm
Mesh Quality Plot	High

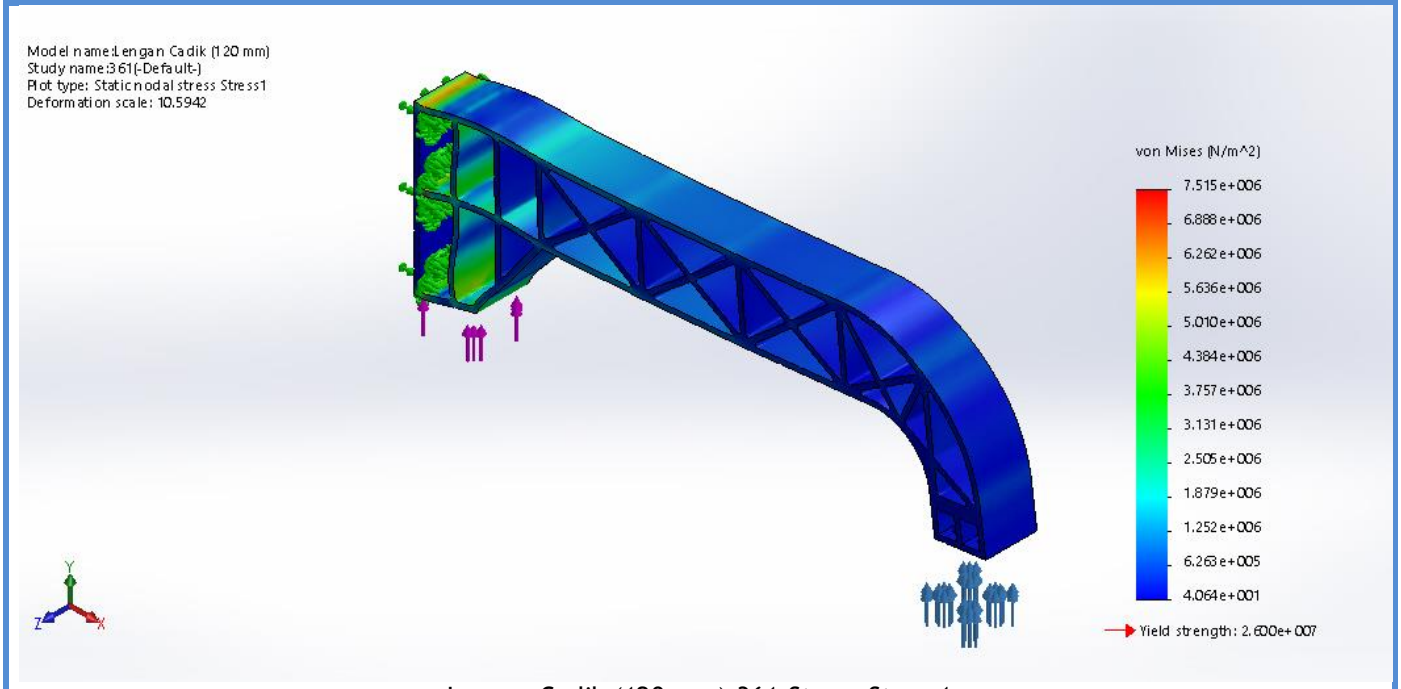
Mesh information - Details

Total Nodes	26216
Total Elements	13004
Maximum Aspect Ratio	20.88
% of elements with Aspect Ratio < 3	65.1
% of elements with Aspect Ratio > 10	0.461
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:05
Computer name:	



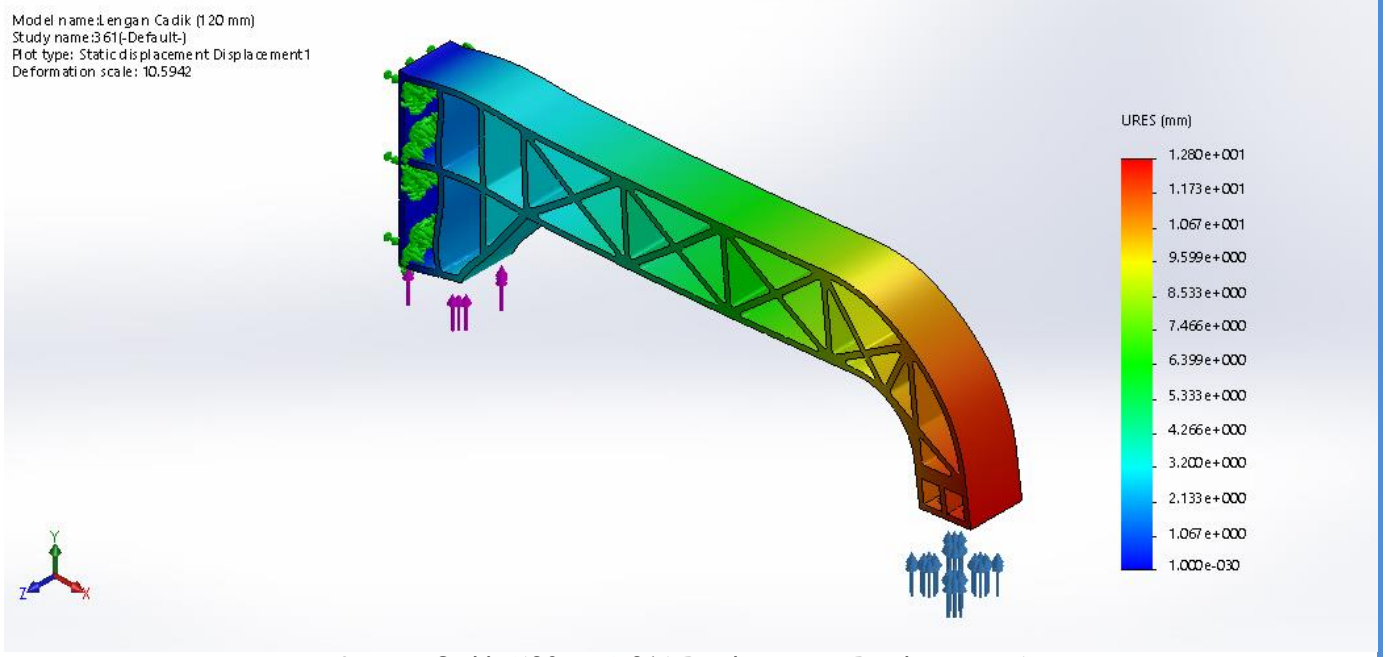
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	4.064e+001N/m^2 Node: 13238	7.515e+006N/m^2 Node: 16188



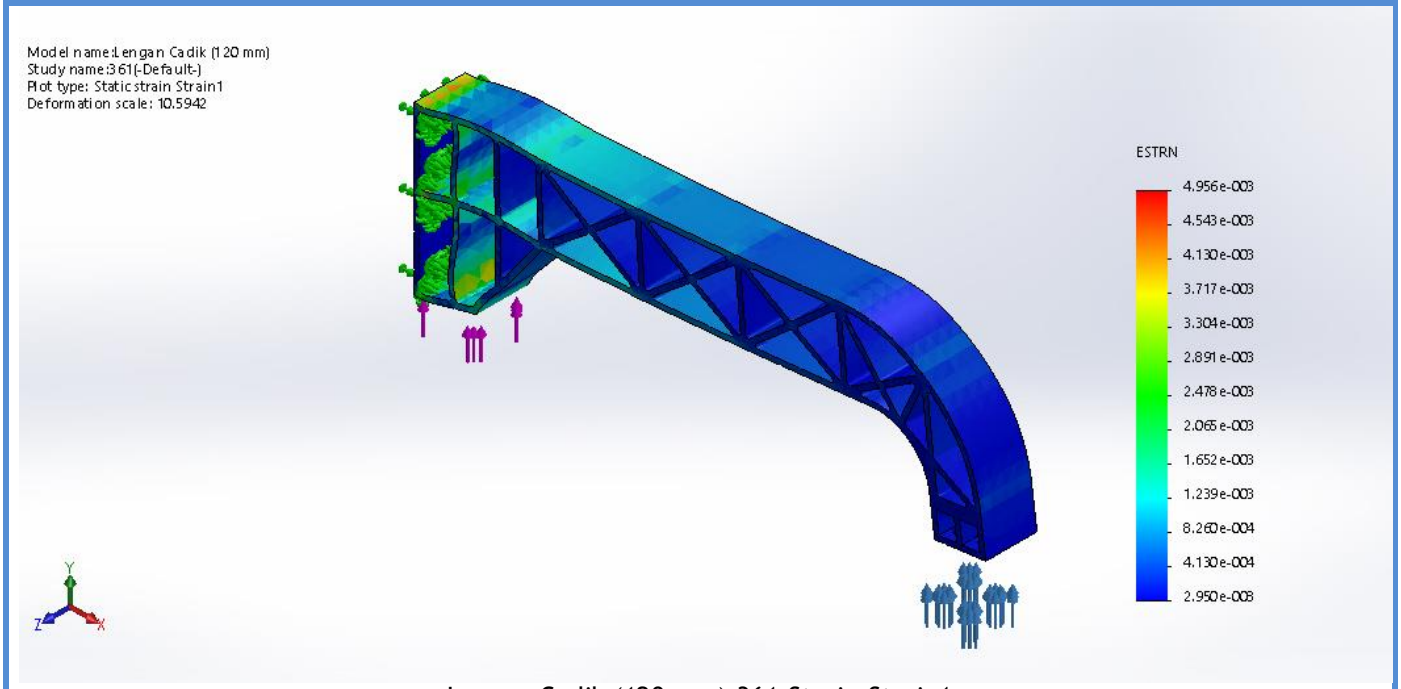
Lengan Cadik (120 mm)-361-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	1.280e+001mm Node: 766



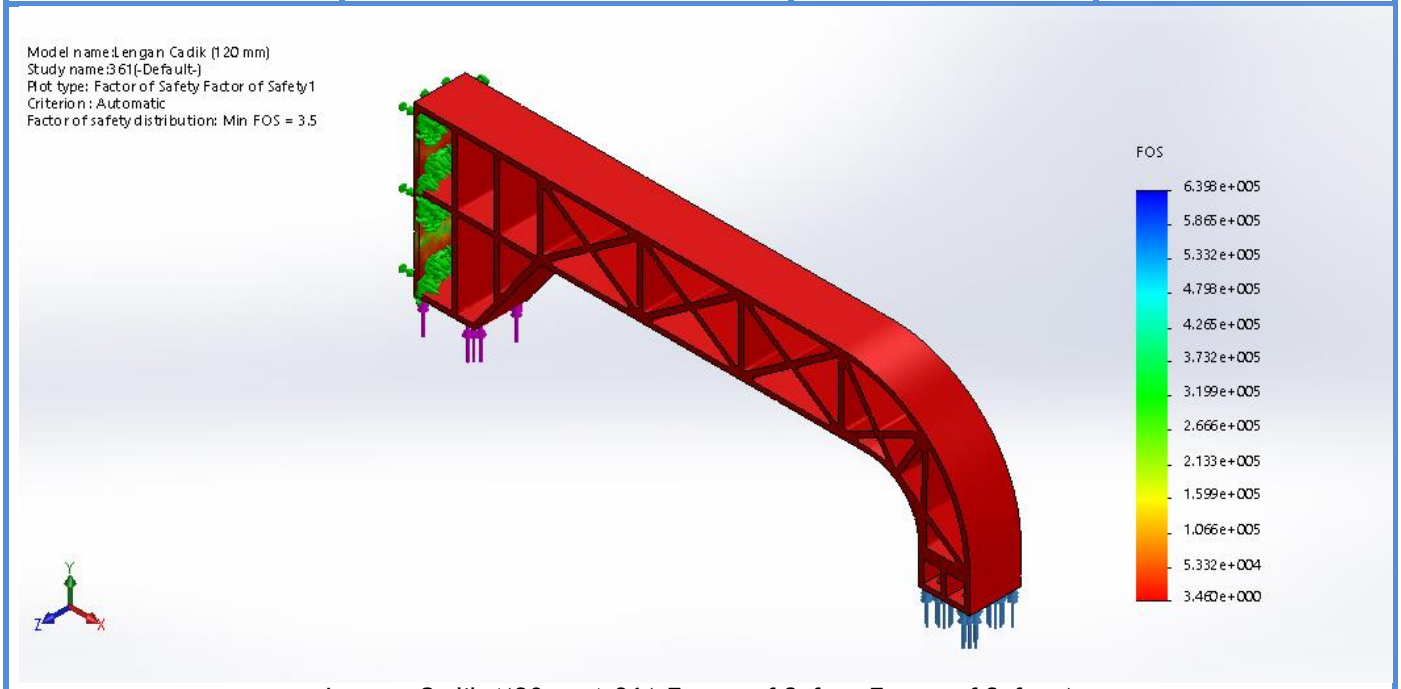
Lengan Cadik (120 mm)-361-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	2.950e-008 Element: 7542	4.956e-003 Element: 10627

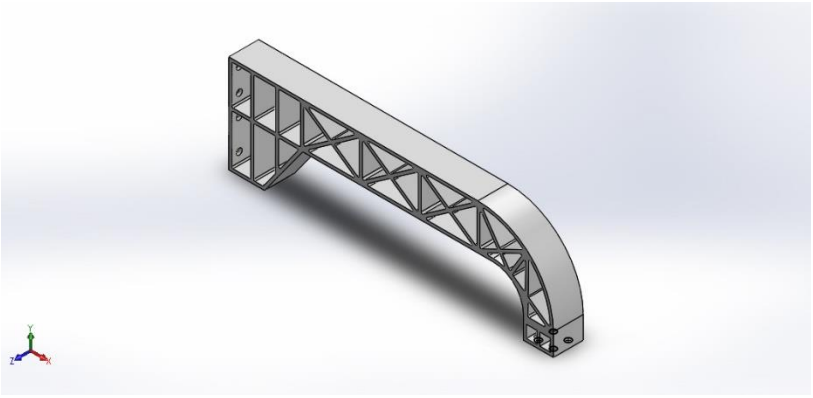


Lengan Cadik (120 mm)-361-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	3.460e+000 Node: 16188	6.398e+005 Node: 13238



Lengan Cadik (120 mm)-361-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (120 mm)

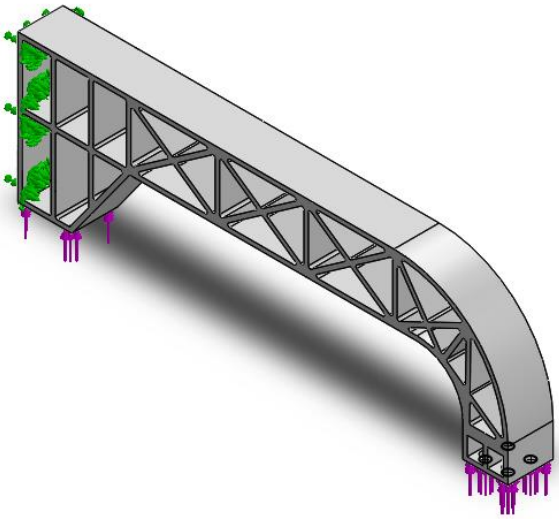
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 633
Analysis type: Static

Table of Contents

Description

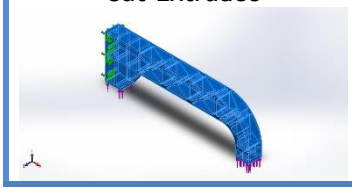
No Data

Model Information



Model name: Lengan Cadik (120 mm)
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude8 	Solid Body	**Mass:10.7214 kg** **Volume:0.011262 m^3** **Density:952 kg/m^3** **Weight:105.07 N**	**E:\Kuliah\SolidWorks\lbar\SolidWork\Lengan Cadik (120 mm).SLDPRT** Jul 09 09:29:23 2018

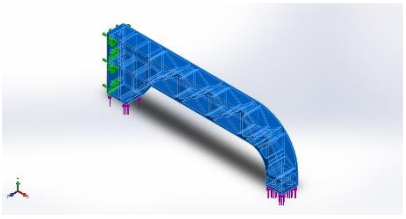
Study Properties

Study name	633
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\I bar\SolidWork)

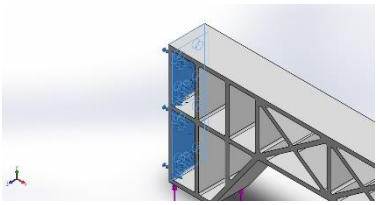
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

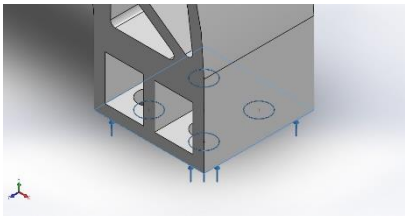
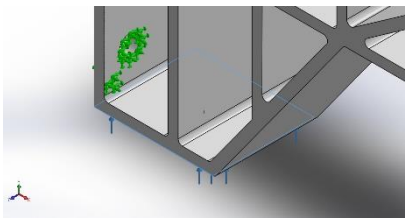
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude8)(Lengan Cadik (120 mm))
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	3.0107	-2882.75	1.48431	2882.76
Reaction Moment(N.m)	0	0	0	0

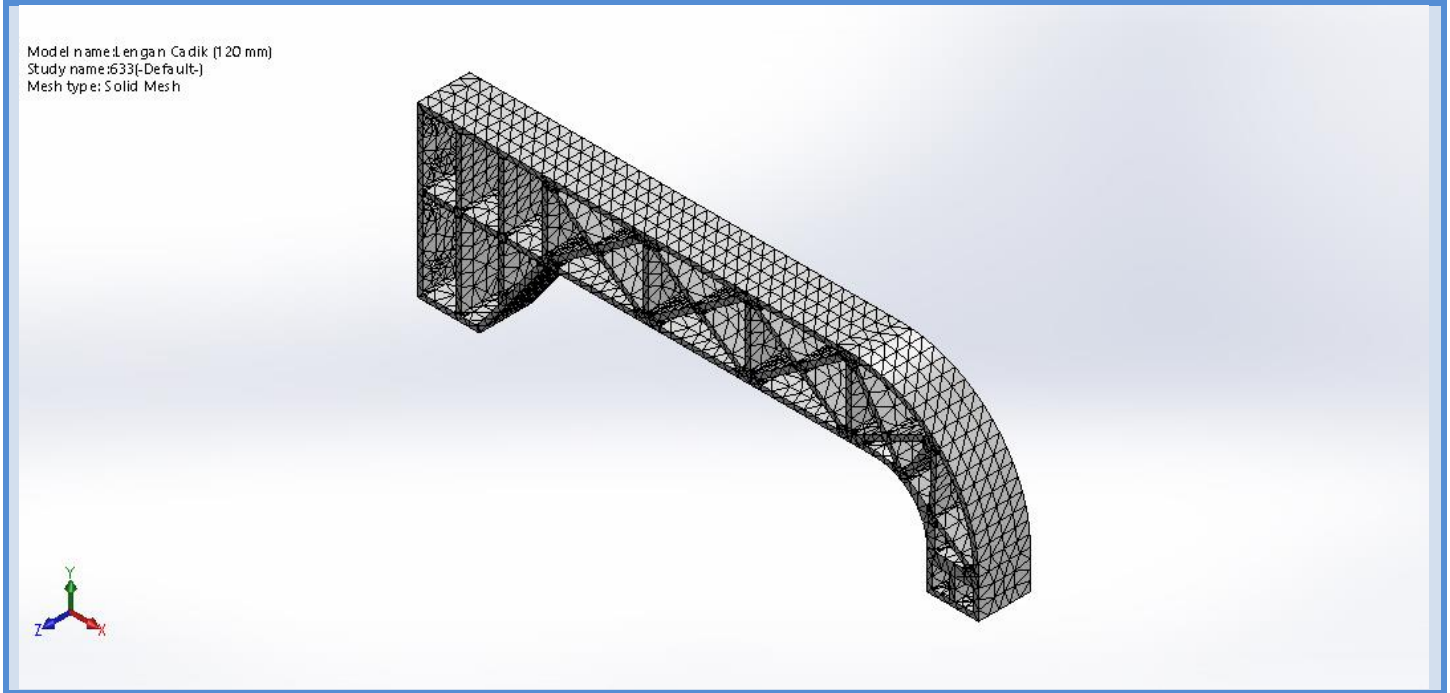
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 633.36 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	26.8096 mm
Tolerance	1.34048 mm
Mesh Quality Plot	High

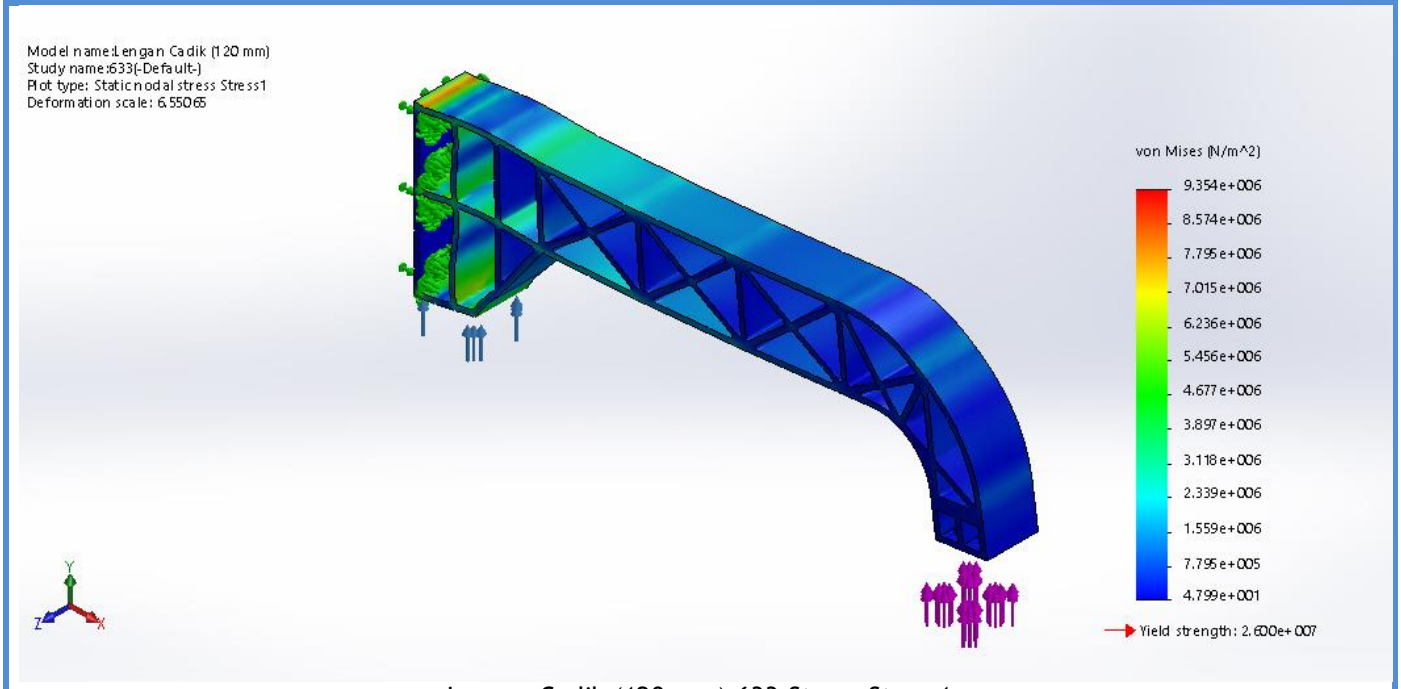
Mesh information - Details

Total Nodes	26216
Total Elements	13004
Maximum Aspect Ratio	20.88
% of elements with Aspect Ratio < 3	65.1
% of elements with Aspect Ratio > 10	0.461
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:05
Computer name:	



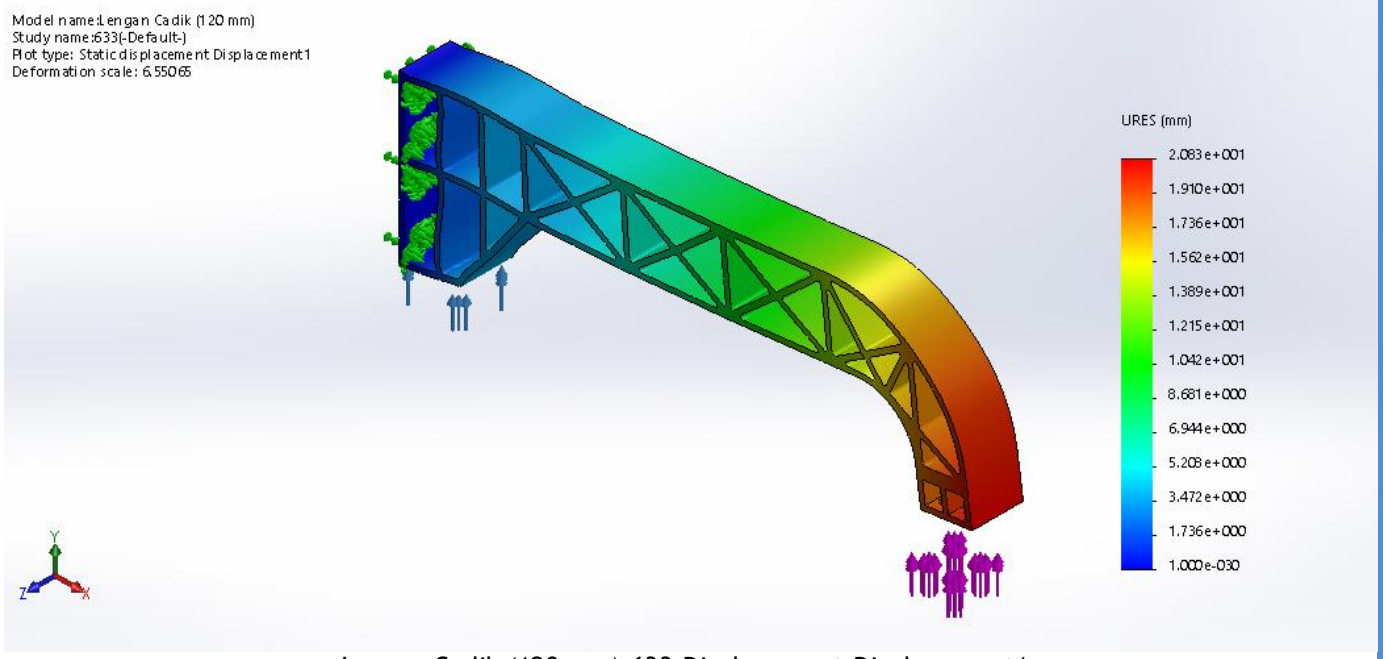
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	4.799e+001N/m^2 Node: 13423	9.354e+006N/m^2 Node: 20210



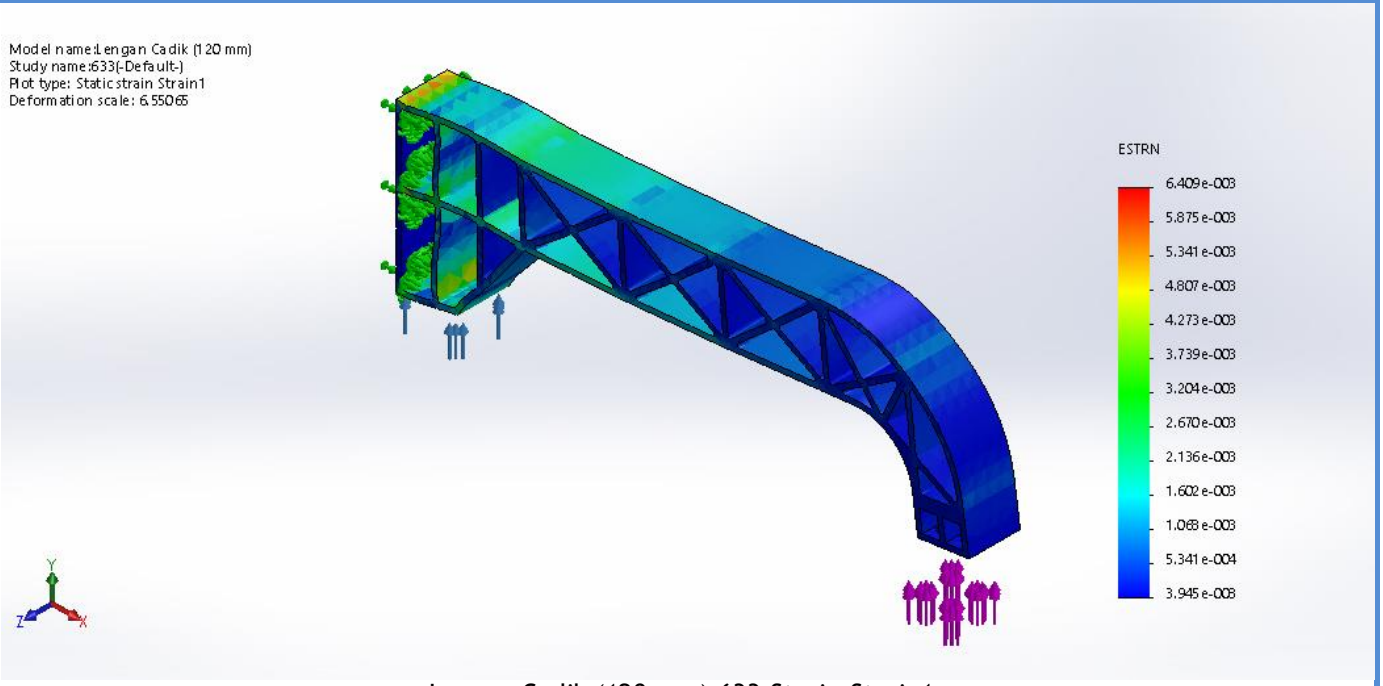
Lengan Cadik (120 mm)-633-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	2.083e+001mm Node: 766



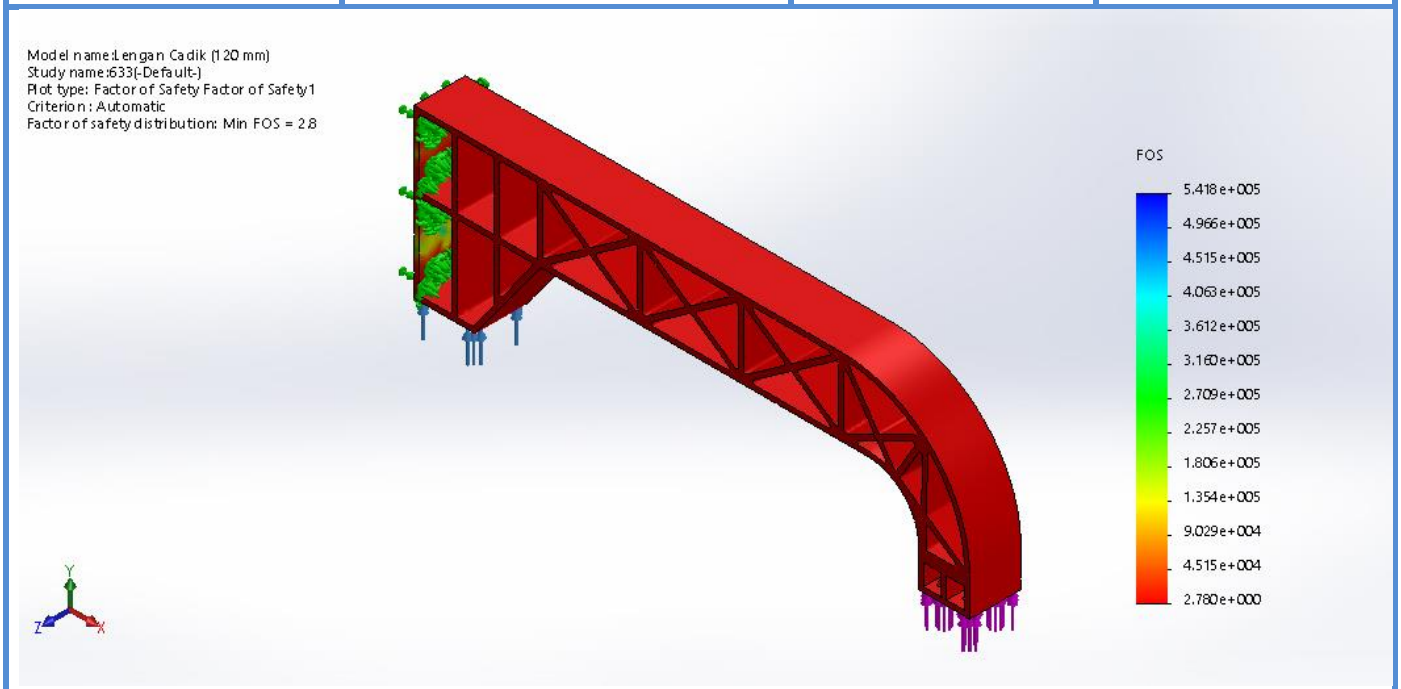
Lengan Cadik (120 mm)-633-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	3.945e-008 Element: 7542	6.409e-003 Element: 10627

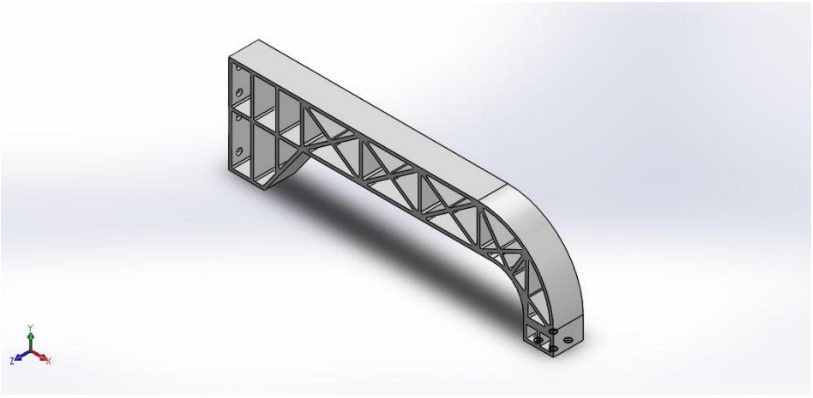


Lengan Cadik (120 mm)-633-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	2.780e+000 Node: 20210	5.418e+005 Node: 13423



Lengan Cadik (120 mm)-633-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (120 mm)

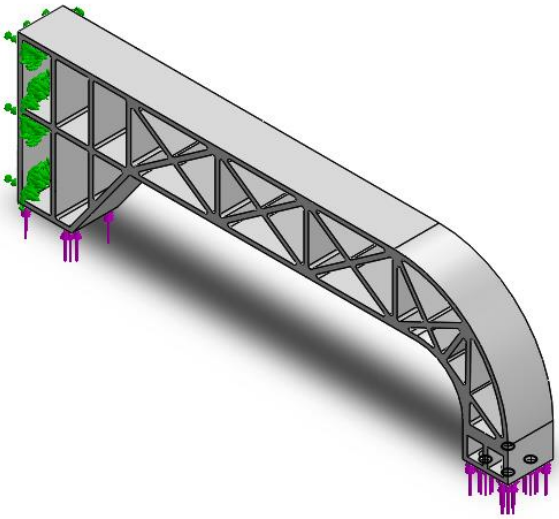
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 916
Analysis type: Static

Table of Contents

Description

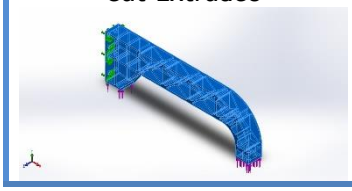
No Data

Model Information



Model name: Lengan Cadik (120 mm)
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude8 	Solid Body	**Mass:10.7214 kg** **Volume:0.011262 m^3** **Density:952 kg/m^3** **Weight:105.07 N**	**E:\Kuliah\SolidWorks\lbar\SolidWork\Lengan Cadik (120 mm).SLDPRT** Jul 09 09:29:23 2018

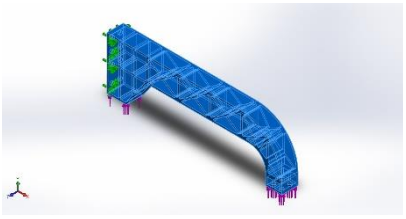
Study Properties

Study name	916
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\I bar\SolidWork)

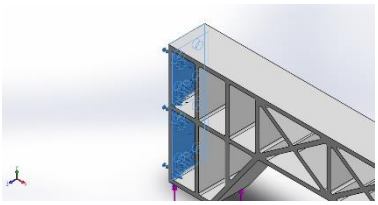
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

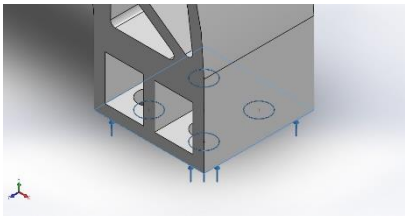
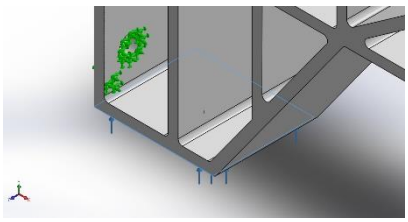
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude8)(Lengan Cadik (120 mm))
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-6.51883	-3168.08	-0.559223	3168.09
Reaction Moment(N.m)	0	0	0	0

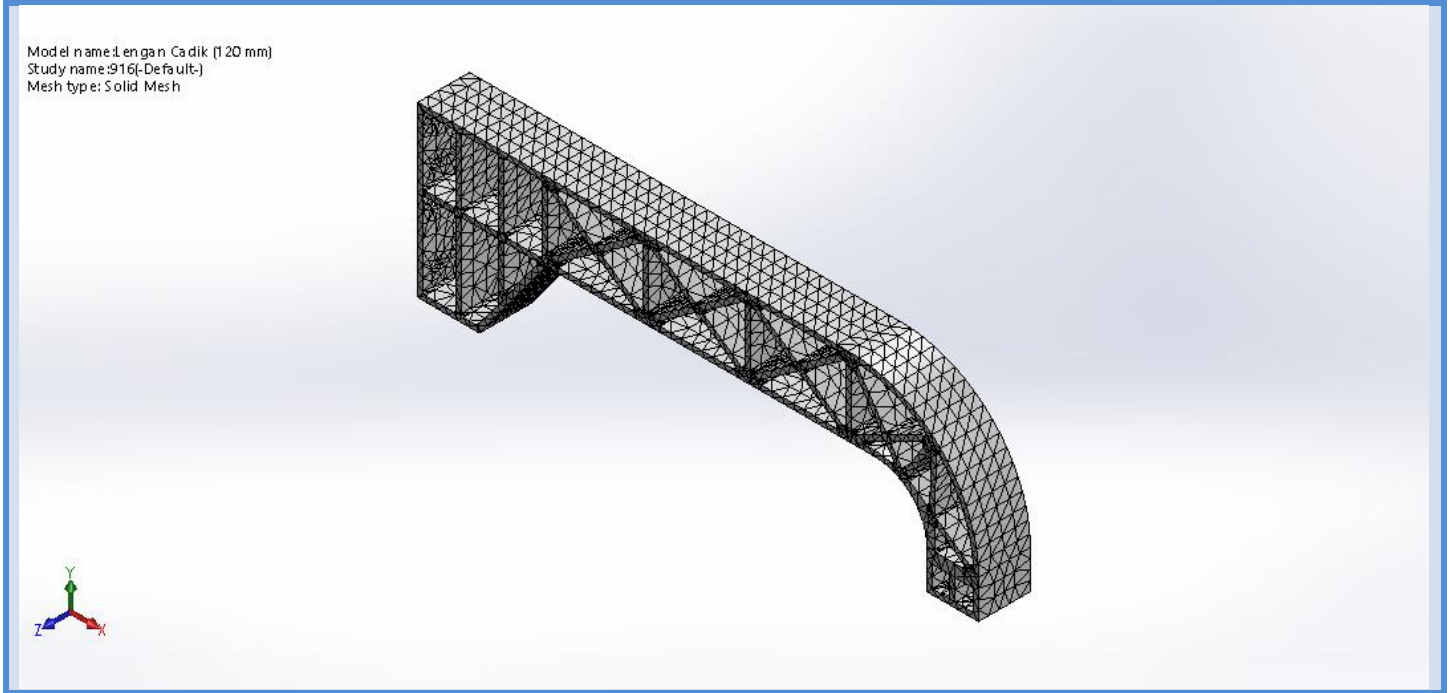
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 916.04 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	26.8096 mm
Tolerance	1.34048 mm
Mesh Quality Plot	High

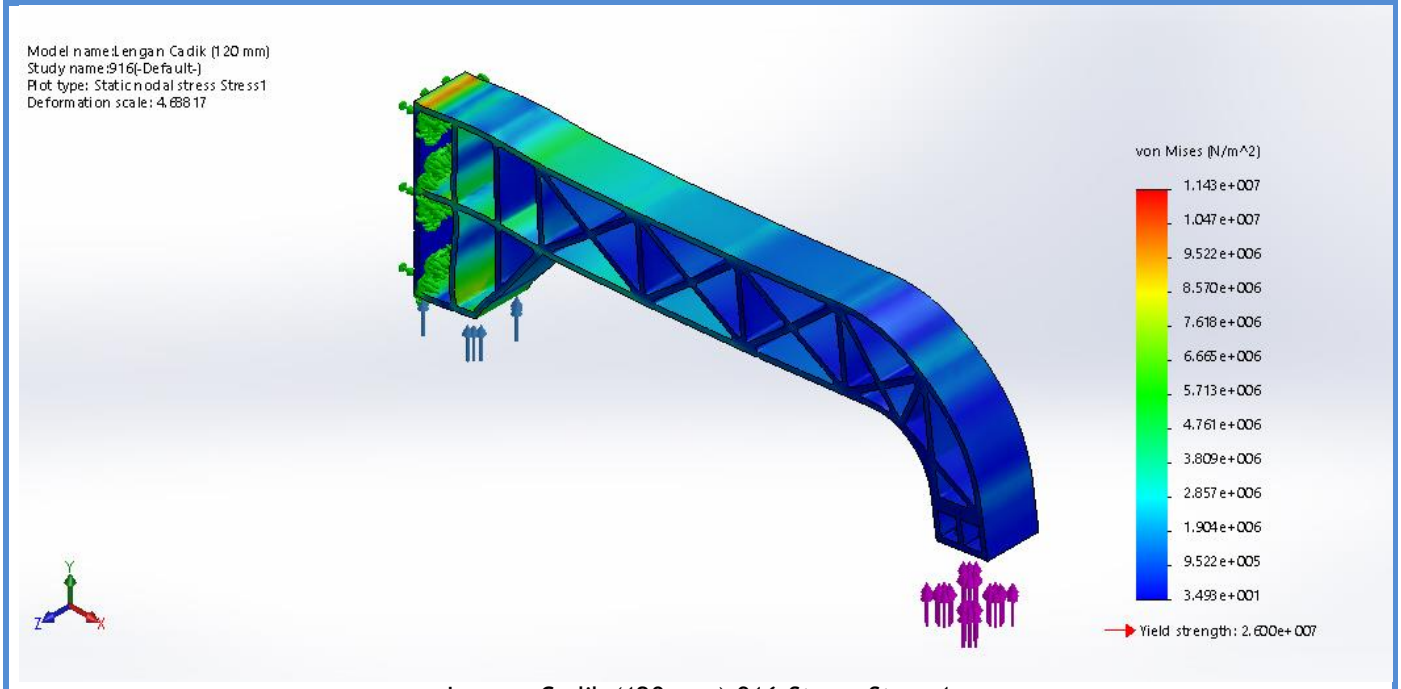
Mesh information - Details

Total Nodes	26216
Total Elements	13004
Maximum Aspect Ratio	20.88
% of elements with Aspect Ratio < 3	65.1
% of elements with Aspect Ratio > 10	0.461
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:05
Computer name:	



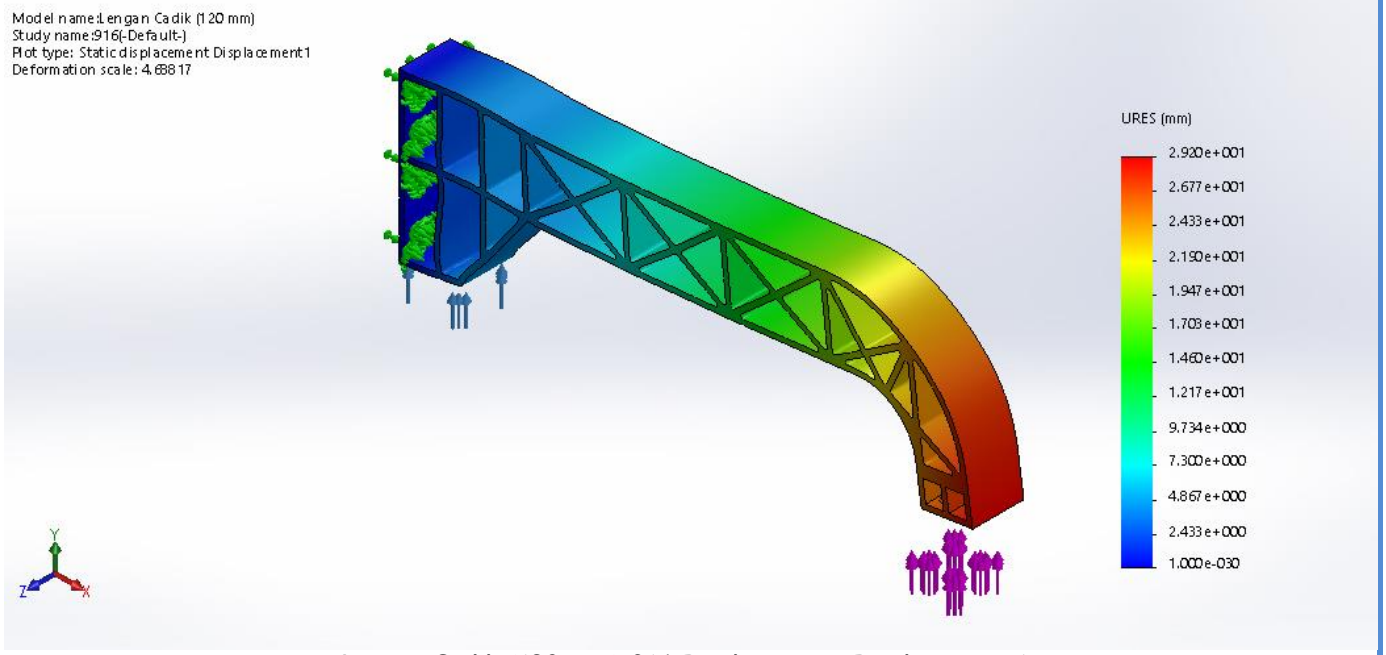
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	3.493e+001N/m^2 Node: 13155	1.143e+007N/m^2 Node: 852



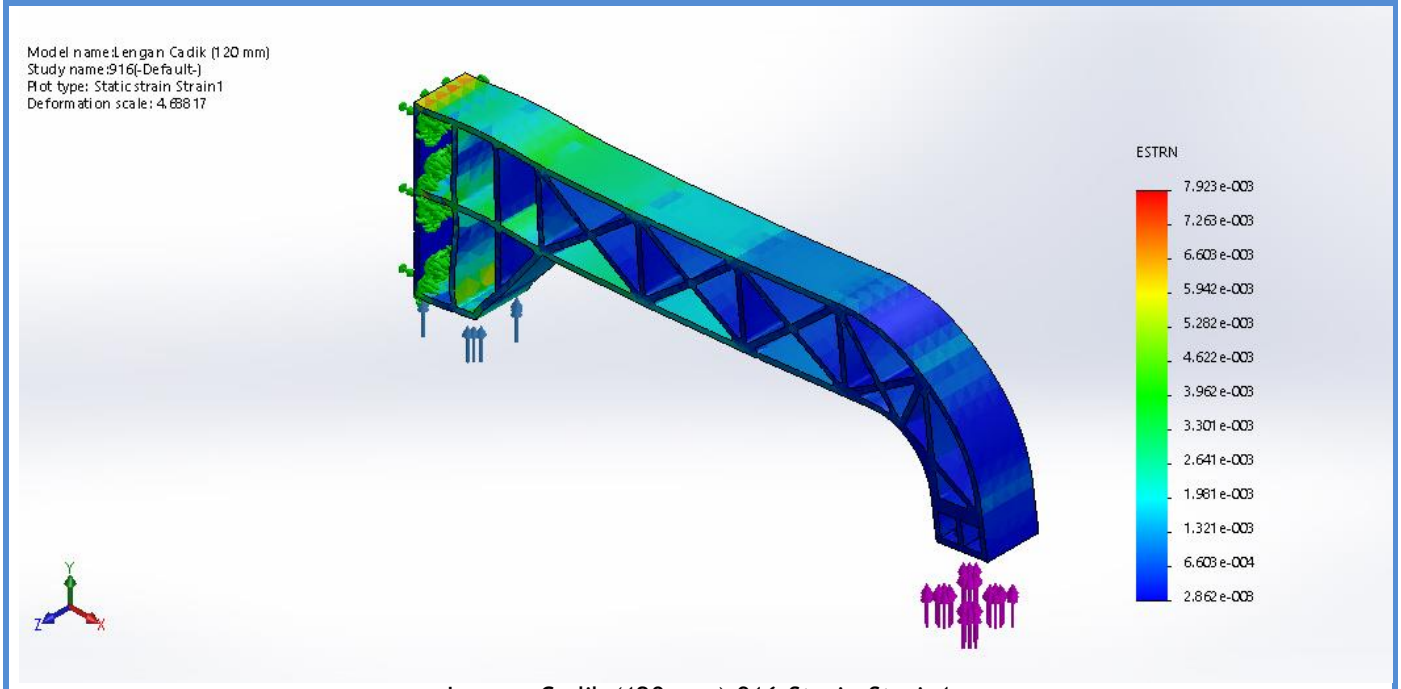
Lengan Cadik (120 mm)-916-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	2.920e+001mm Node: 11915



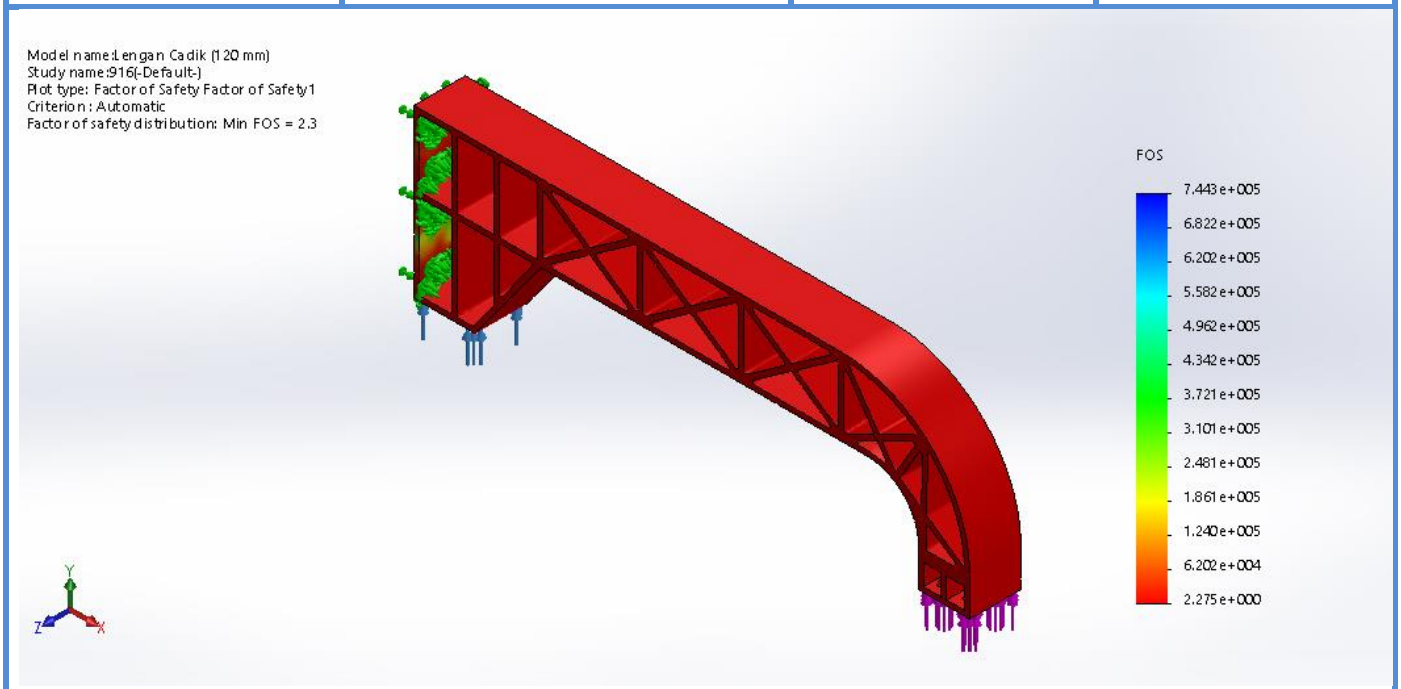
Lengan Cadik (120 mm)-916-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	2.862e-008 Element: 7556	7.923e-003 Element: 10627

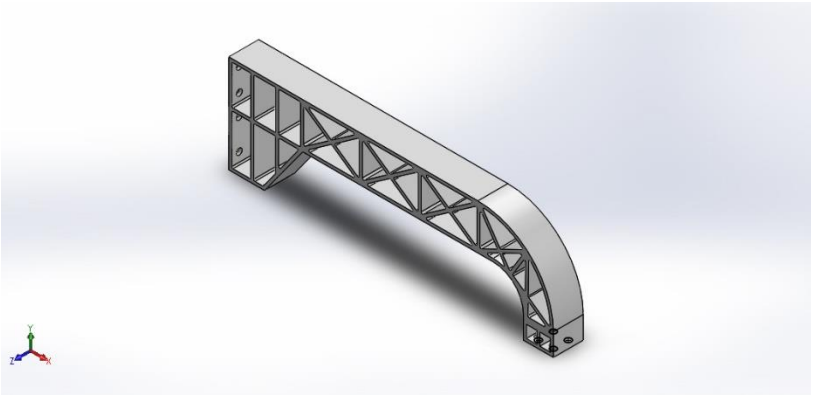


Lengan Cadik (120 mm)-916-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	2.275e+000 Node: 852	7.443e+005 Node: 13155



Lengan Cadik (120 mm)-916-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (120 mm)

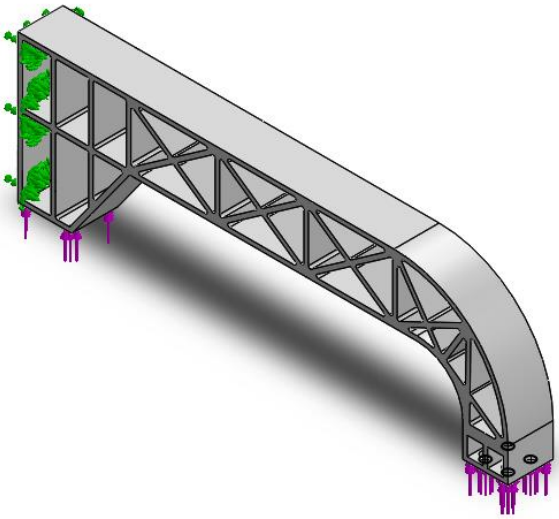
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 1213
Analysis type: Static

Table of Contents

Description

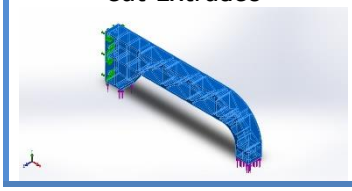
No Data

Model Information



Model name: Lengan Cadik (120 mm)
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude8 	Solid Body	**Mass:10.7214 kg** **Volume:0.011262 m^3** **Density:952 kg/m^3** **Weight:105.07 N**	**E:\Kuliah\SolidWorks\lbar\SolidWork\Lengan Cadik (120 mm).SLDPRT** Jul 09 09:29:23 2018

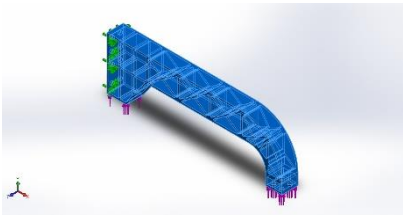
Study Properties

Study name	1213
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\I bar\SolidWork)

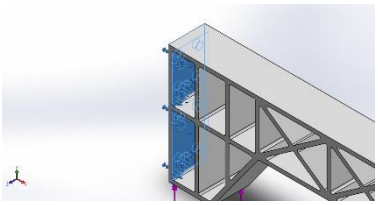
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

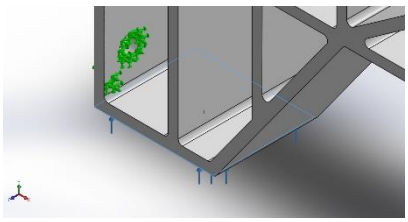
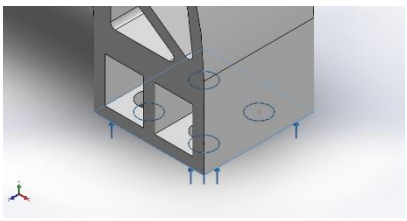
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude8)(Lengan Cadik (120 mm))
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	0.50173	-3463.68	-0.373	3463.68
Reaction Moment(N.m)	0	0	0	0

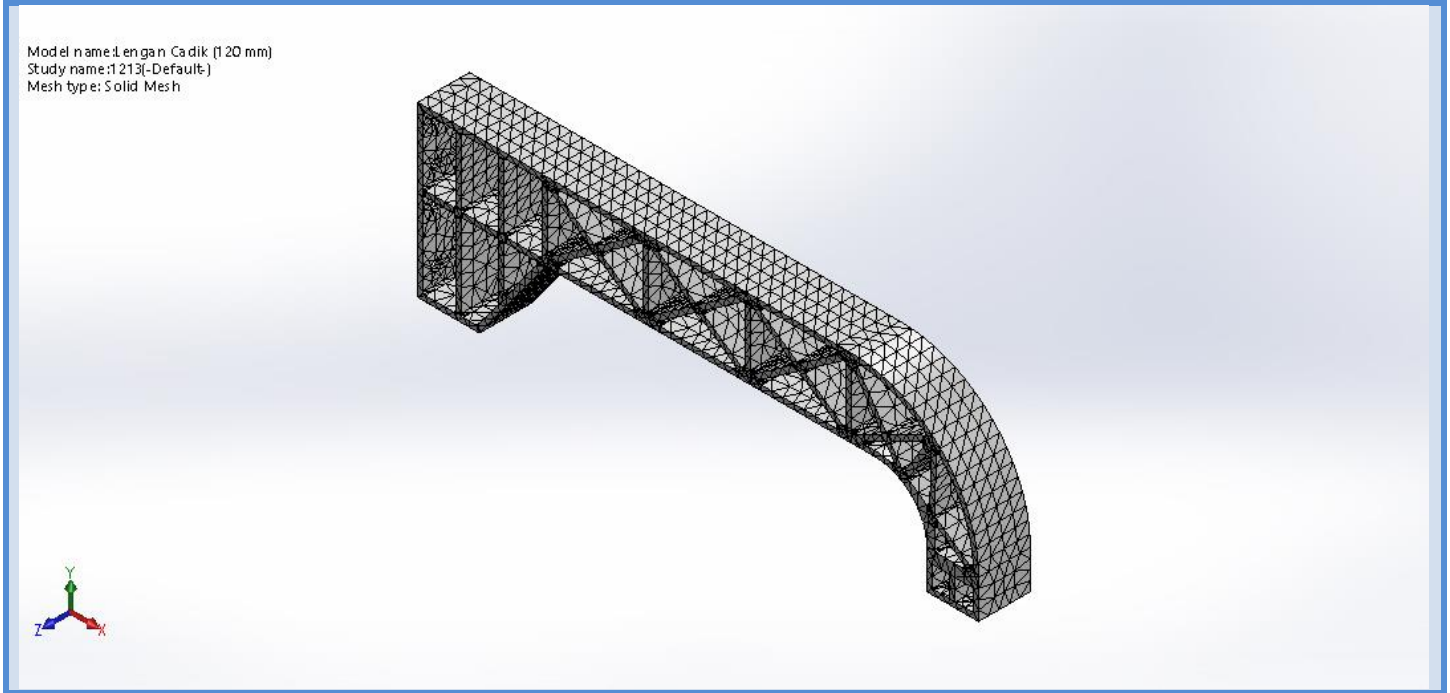
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 1213.18 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	26.8096 mm
Tolerance	1.34048 mm
Mesh Quality Plot	High

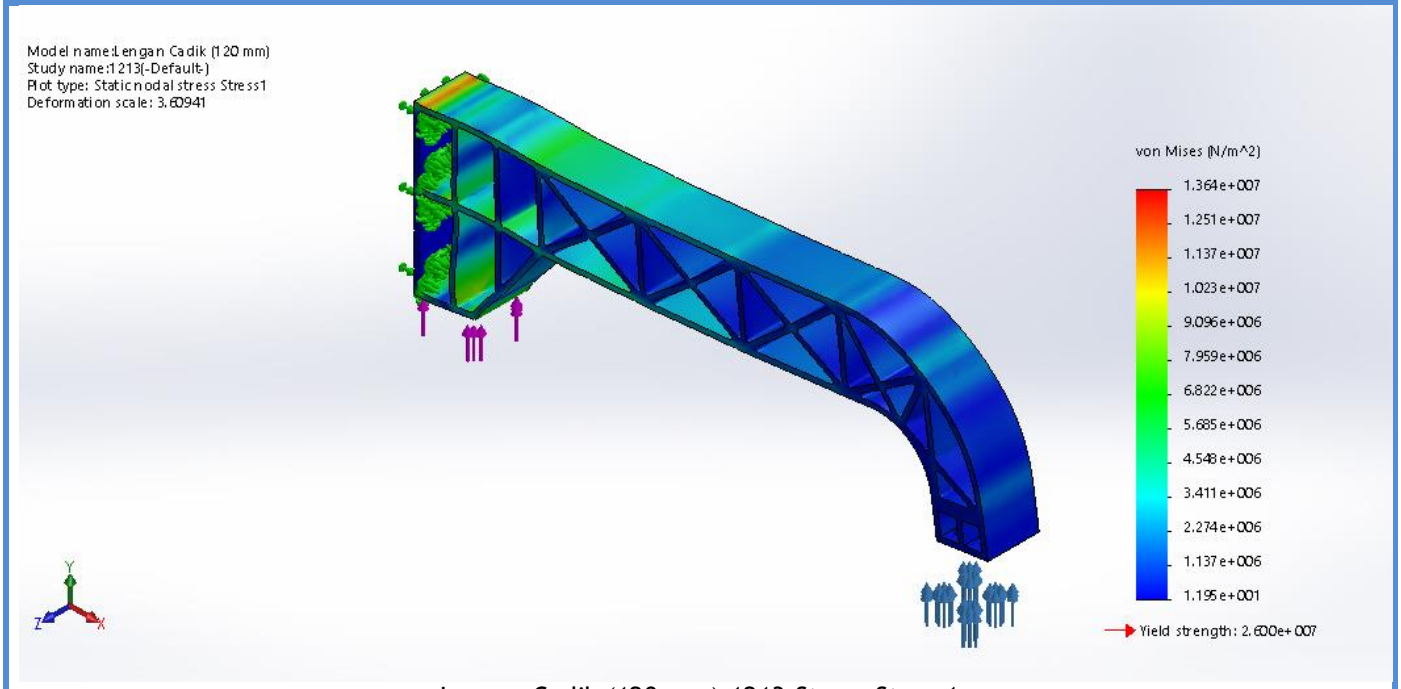
Mesh information - Details

Total Nodes	26216
Total Elements	13004
Maximum Aspect Ratio	20.88
% of elements with Aspect Ratio < 3	65.1
% of elements with Aspect Ratio > 10	0.461
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



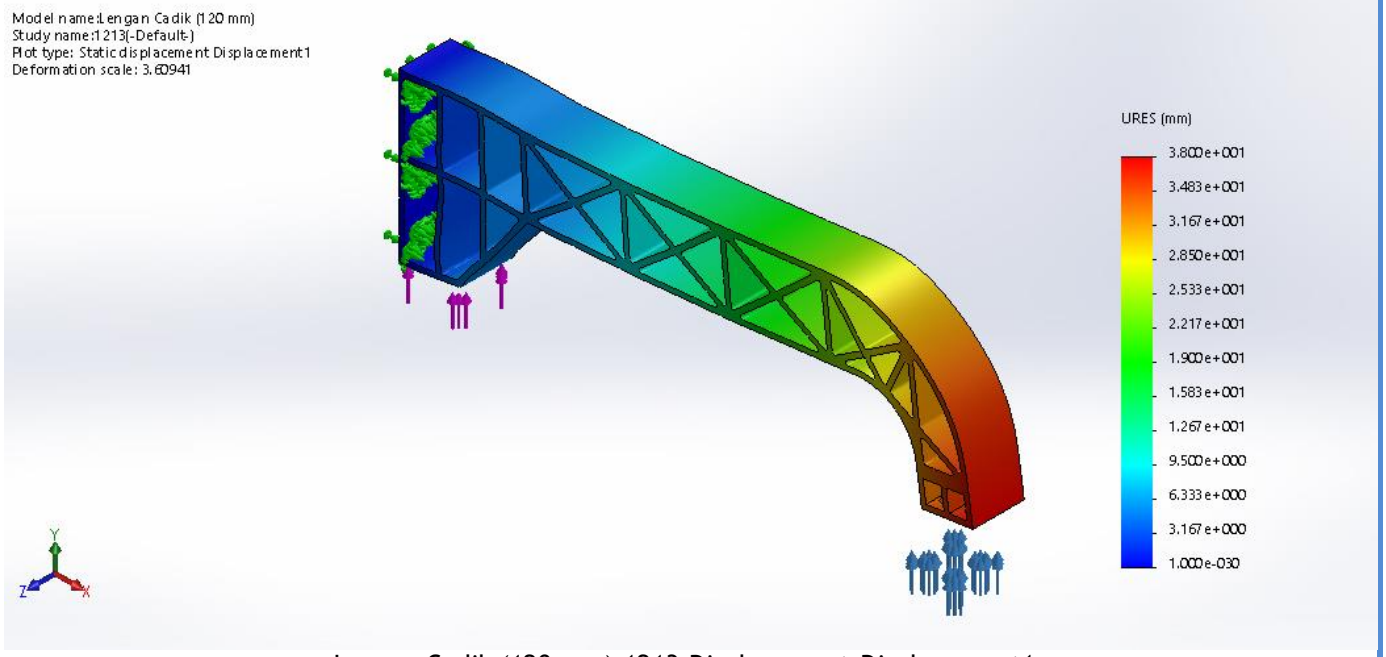
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	1.195e+001N/m^2 Node: 2281	1.364e+007N/m^2 Node: 852



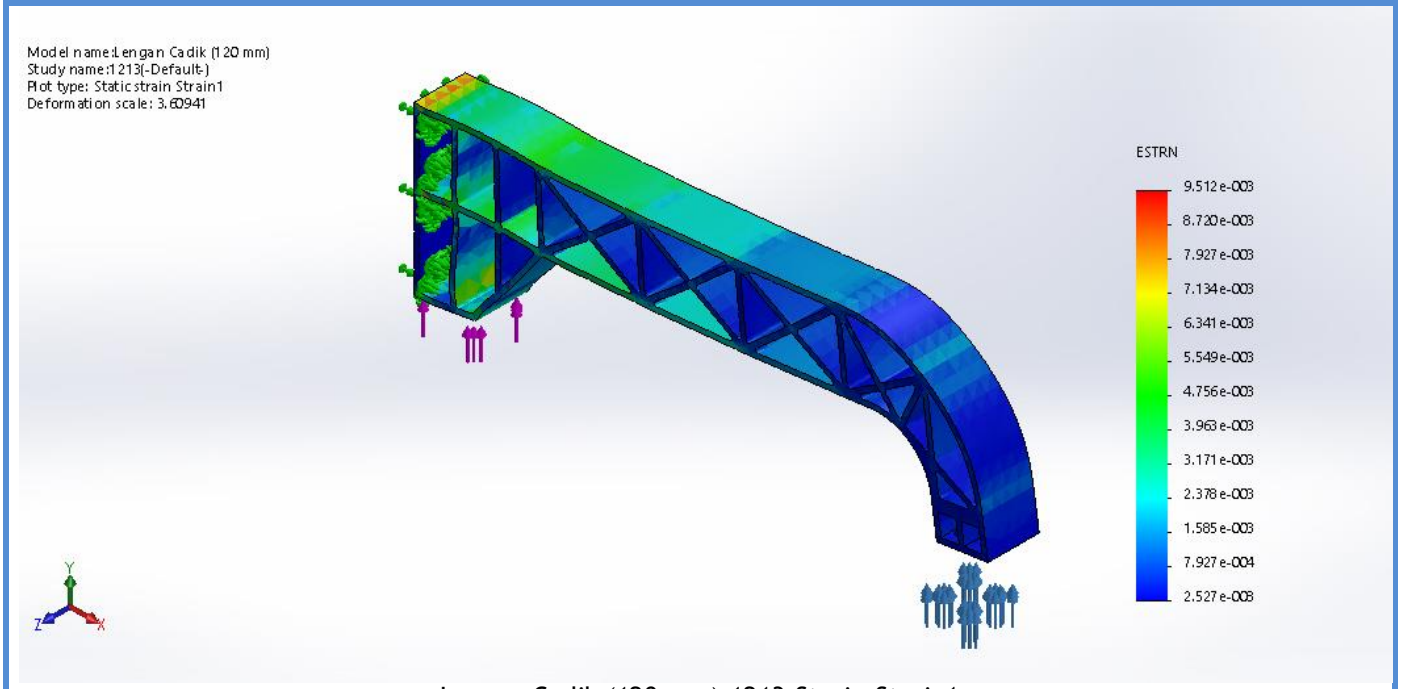
Lengan Cadik (120 mm)-1213-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	3.800e+001mm Node: 766



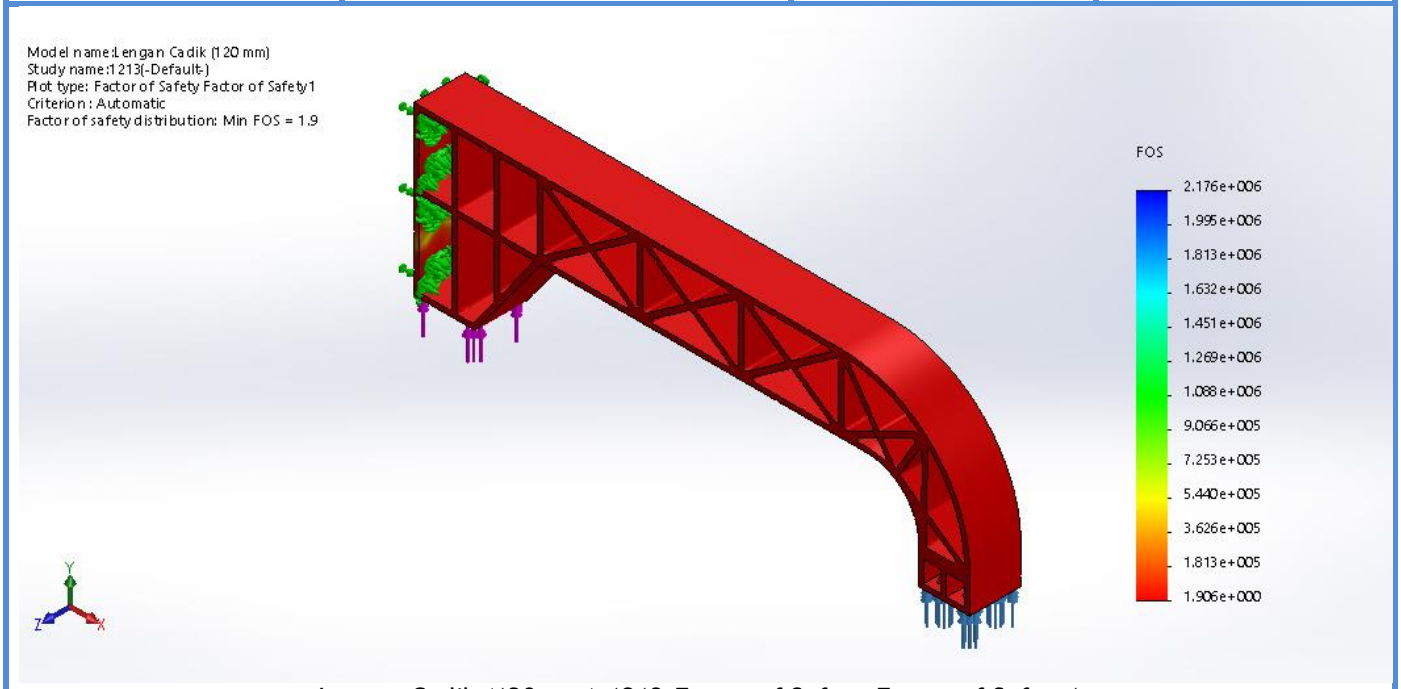
Lengan Cadik (120 mm)-1213-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	2.527e-008 Element: 7553	9.512e-003 Element: 10627

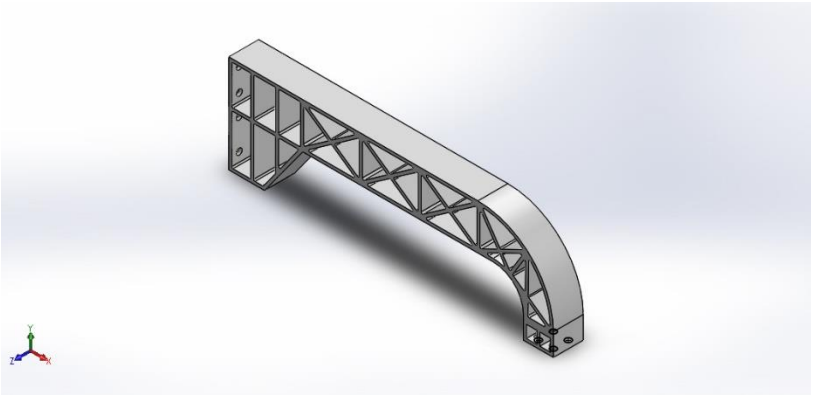


Lengan Cadik (120 mm)-1213-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.906e+000 Node: 852	2.176e+006 Node: 2281



Lengan Cadik (120 mm)-1213-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (120 mm)

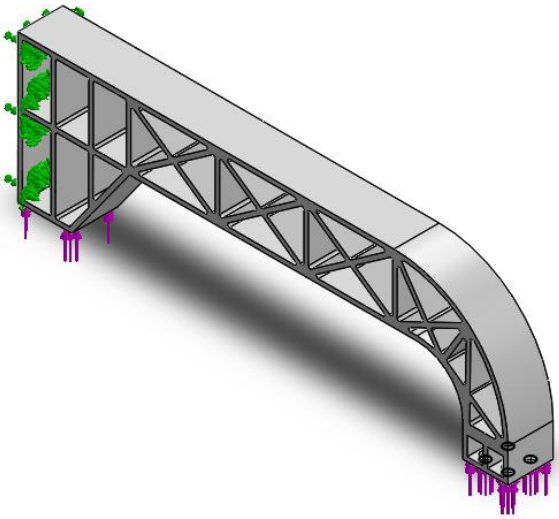
Date: Selasa, 10 Juli 2018
Designer: Solidworks
Study name: 1482
Analysis type: Static

Table of Contents

Description

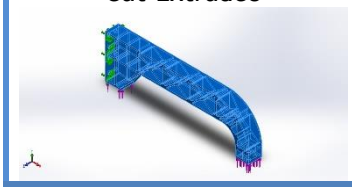
No Data

Model Information



Model name: Lengan Cadik (120 mm)
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude8 	Solid Body	**Mass:10.7214 kg** **Volume:0.011262 m^3** **Density:952 kg/m^3** **Weight:105.07 N**	**E:\Kuliah\SolidWorks\lbar\SolidWork\Lengan Cadik (120 mm).SLDPRT** Jul 09 09:29:23 2018

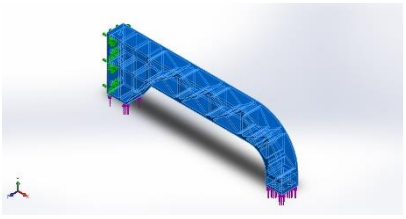
Study Properties

Study name	1482
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	On
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\I bar\SolidWork)

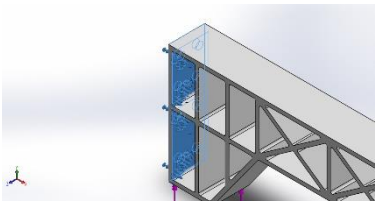
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

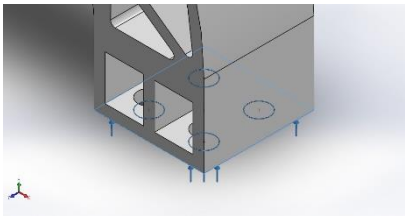
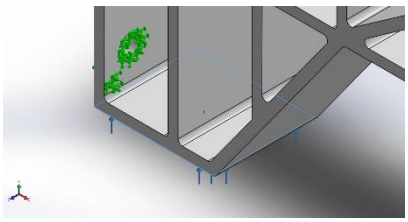
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Cut-Extrude8)(Lengan Cadik (120 mm))
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	0.014317	-3732.77	-0.0822157	3732.77
Reaction Moment(N.m)	0	0	0	0

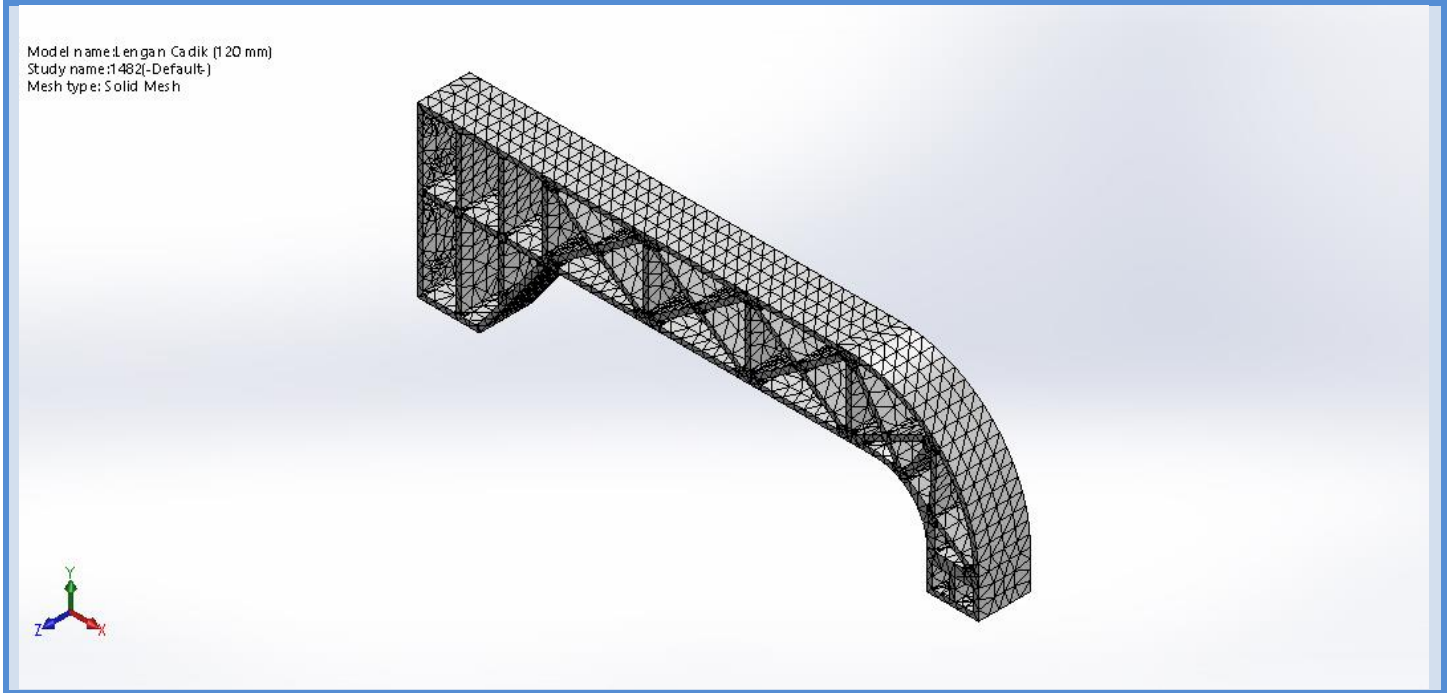
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 1482.27 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	26.8096 mm
Tolerance	1.34048 mm
Mesh Quality Plot	High

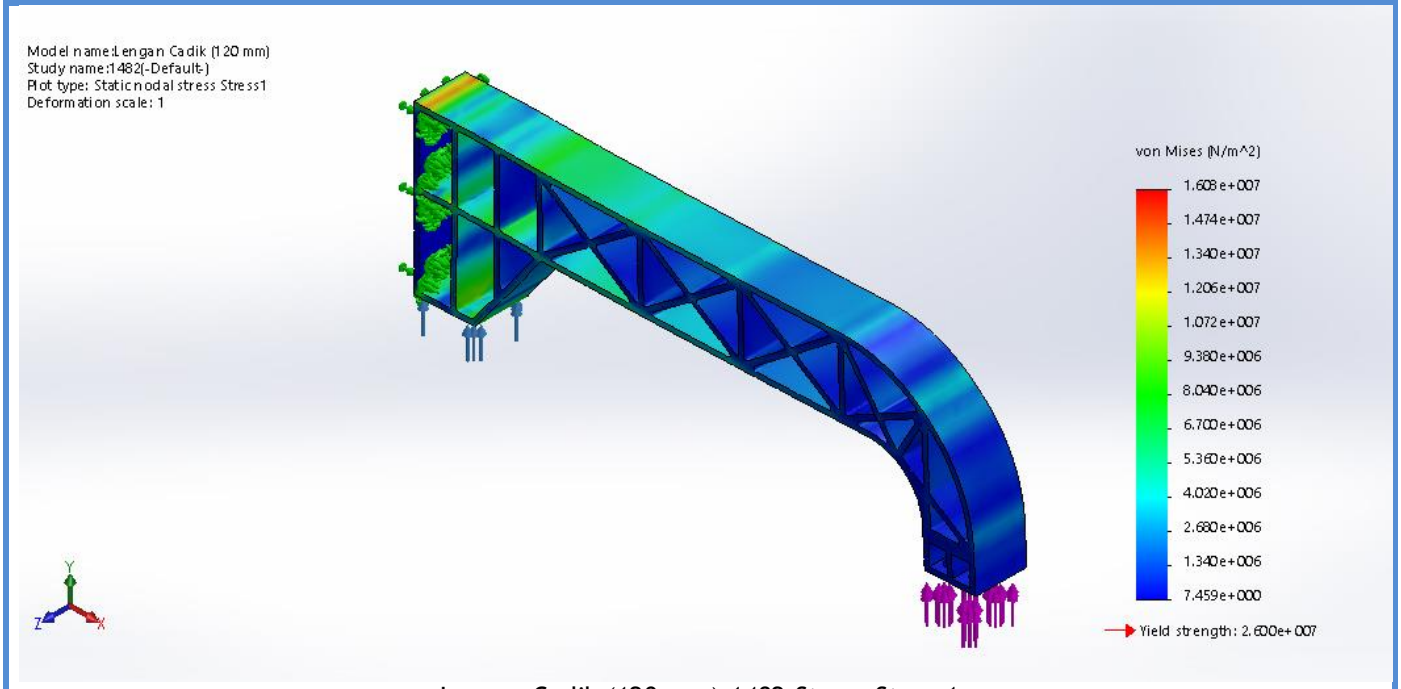
Mesh information - Details

Total Nodes	26216
Total Elements	13004
Maximum Aspect Ratio	20.88
% of elements with Aspect Ratio < 3	65.1
% of elements with Aspect Ratio > 10	0.461
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:05
Computer name:	



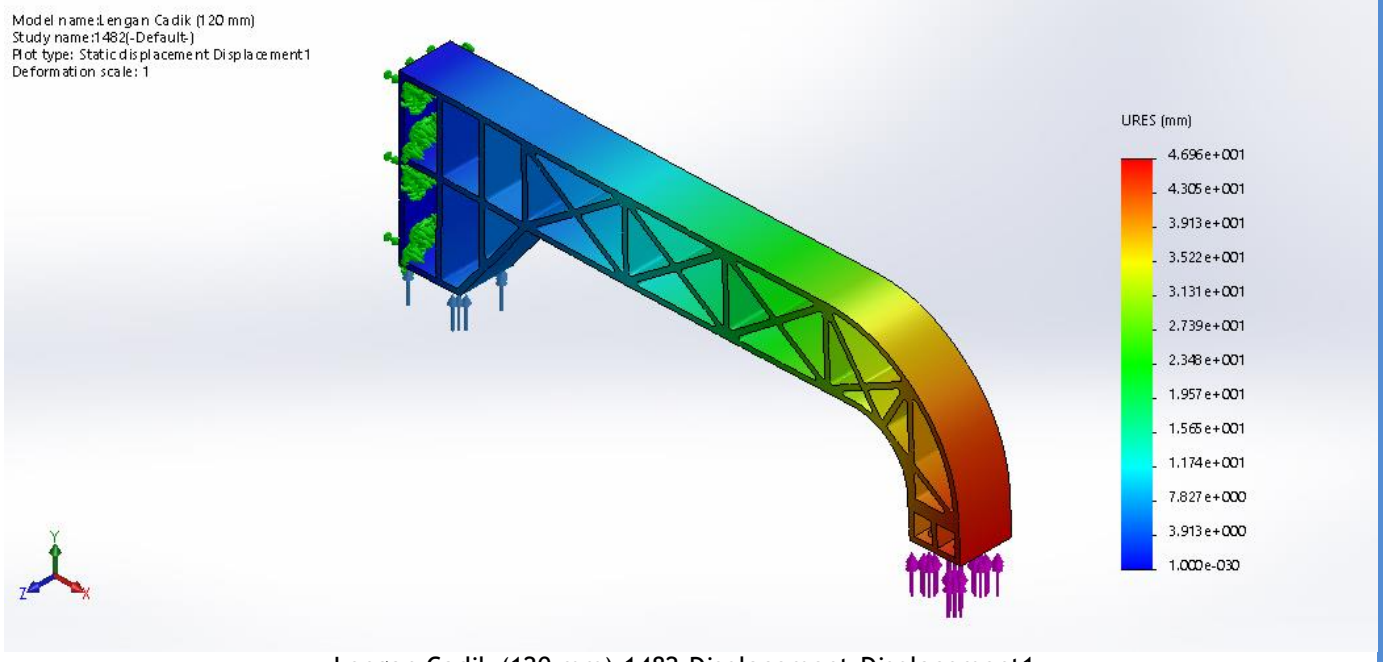
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	7.459e+000N/m^2 Node: 16103	1.608e+007N/m^2 Node: 852



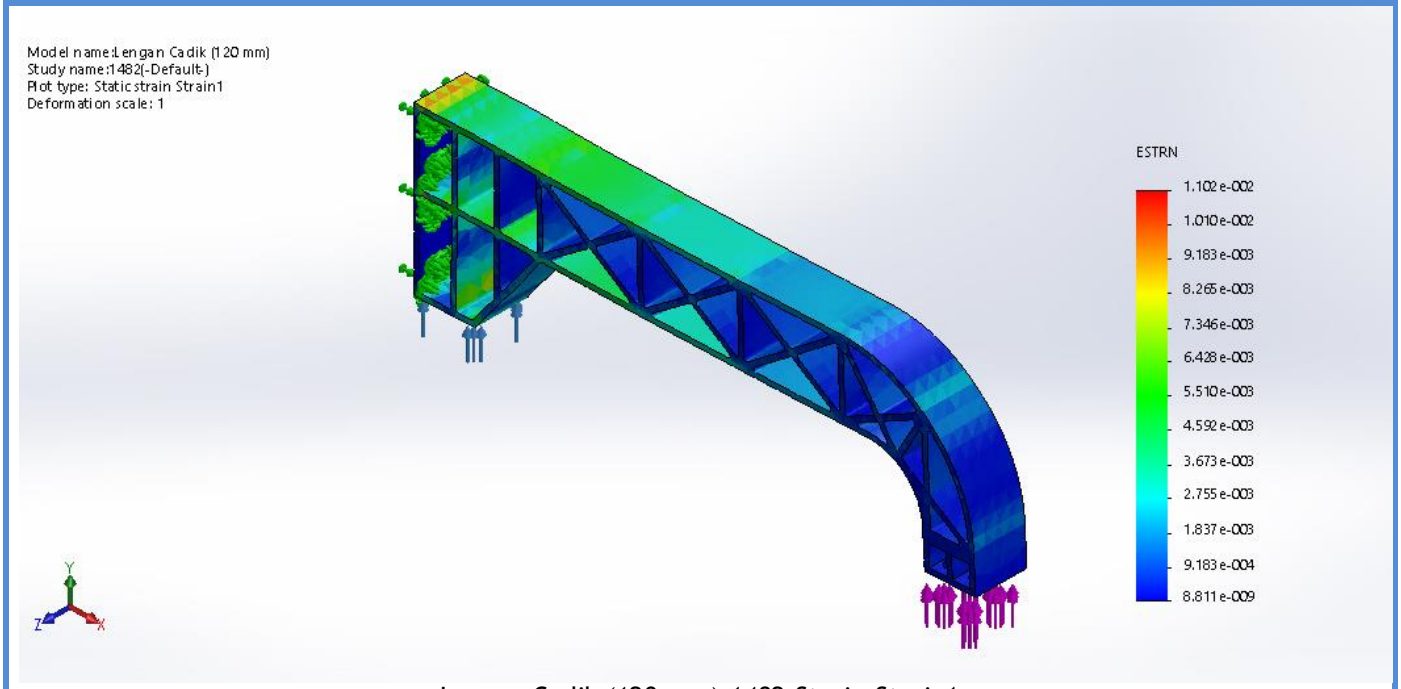
Lengan Cadik (120 mm)-1482-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 57	4.696e+001mm Node: 766



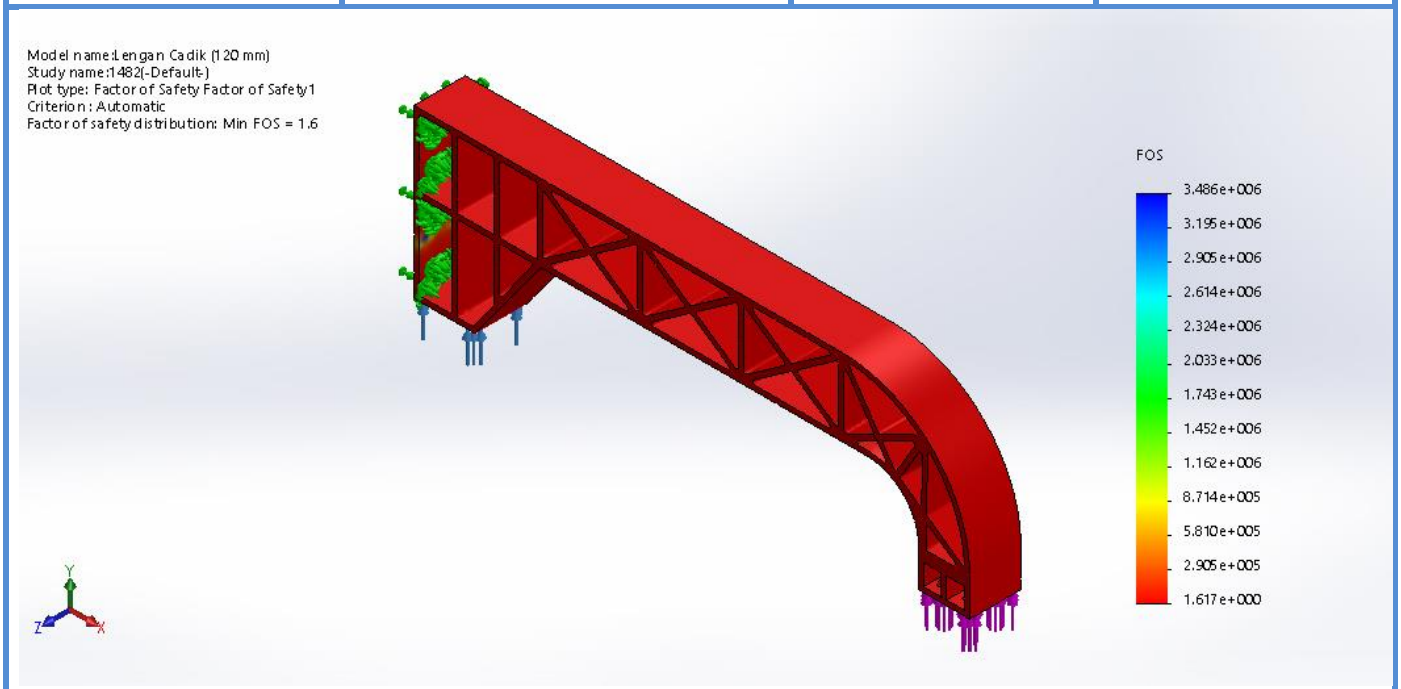
Lengan Cadik (120 mm)-1482-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	8.811e-009 Element: 2017	1.102e-002 Element: 10627

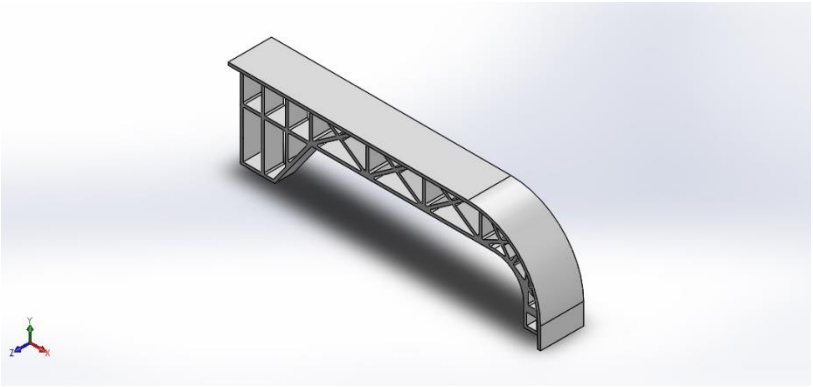


Lengan Cadik (120 mm)-1482-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.617e+000 Node: 852	3.486e+006 Node: 16103



Lengan Cadik (120 mm)-1482-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (80 mm) - Fix

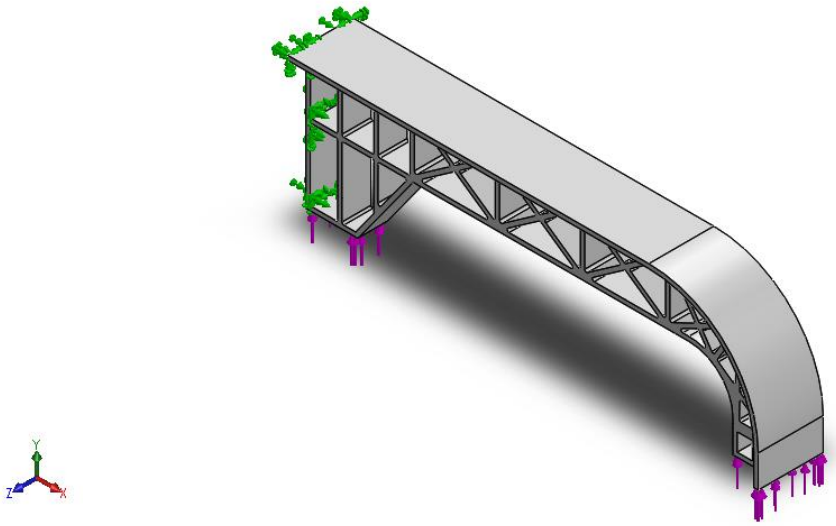
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 133
Analysis type: Static

Table of Contents

Description

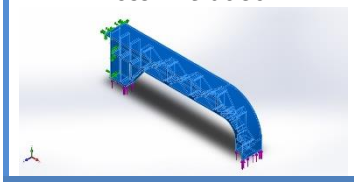
No Data

Model Information



Model name: Lengan Cadik (80 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude6 	Solid Body	**Mass:8.97192 kg** **Volume:0.00942429 m^3** **Density:952 kg/m^3** **Weight:87.9248 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (80 mm) - Fix.SLDPRT** Jul 09 07:04:48 2018

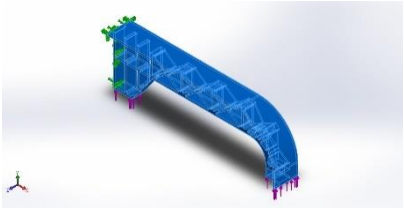
Study Properties

Study name	133
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

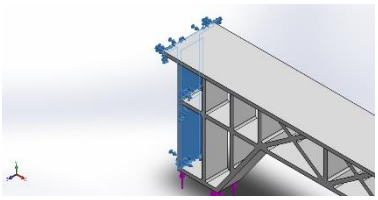
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

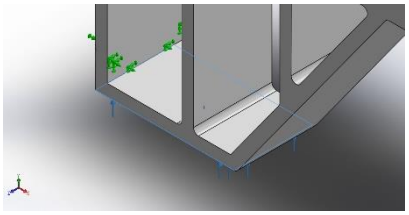
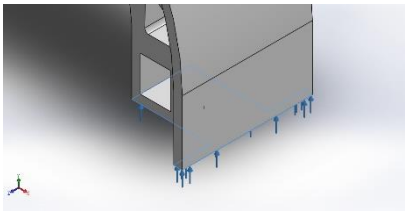
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude6)(Lengan Cadik (80 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	0.687973	-2383.35	0.194282	2383.35
Reaction Moment(N.m)	0	0	0	0

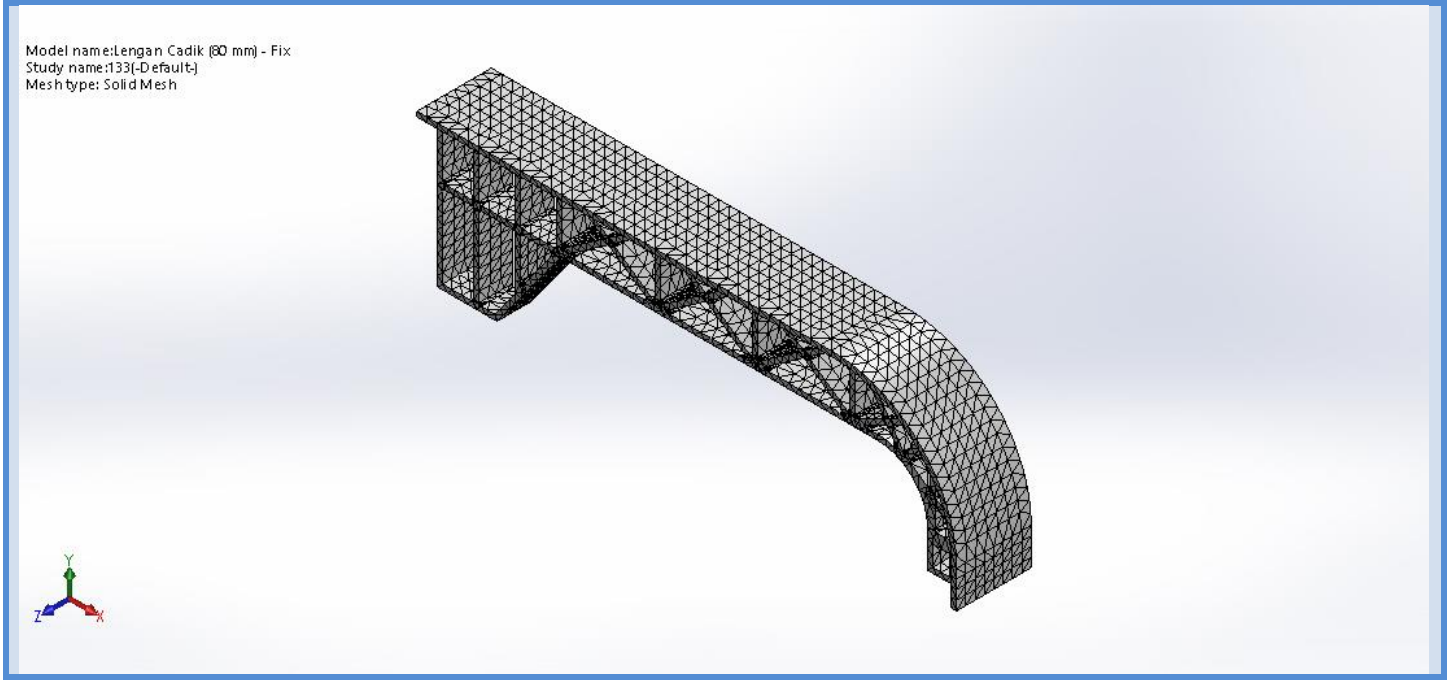
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 133.55 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	25.0962 mm
Tolerance	1.25481 mm
Mesh Quality Plot	High

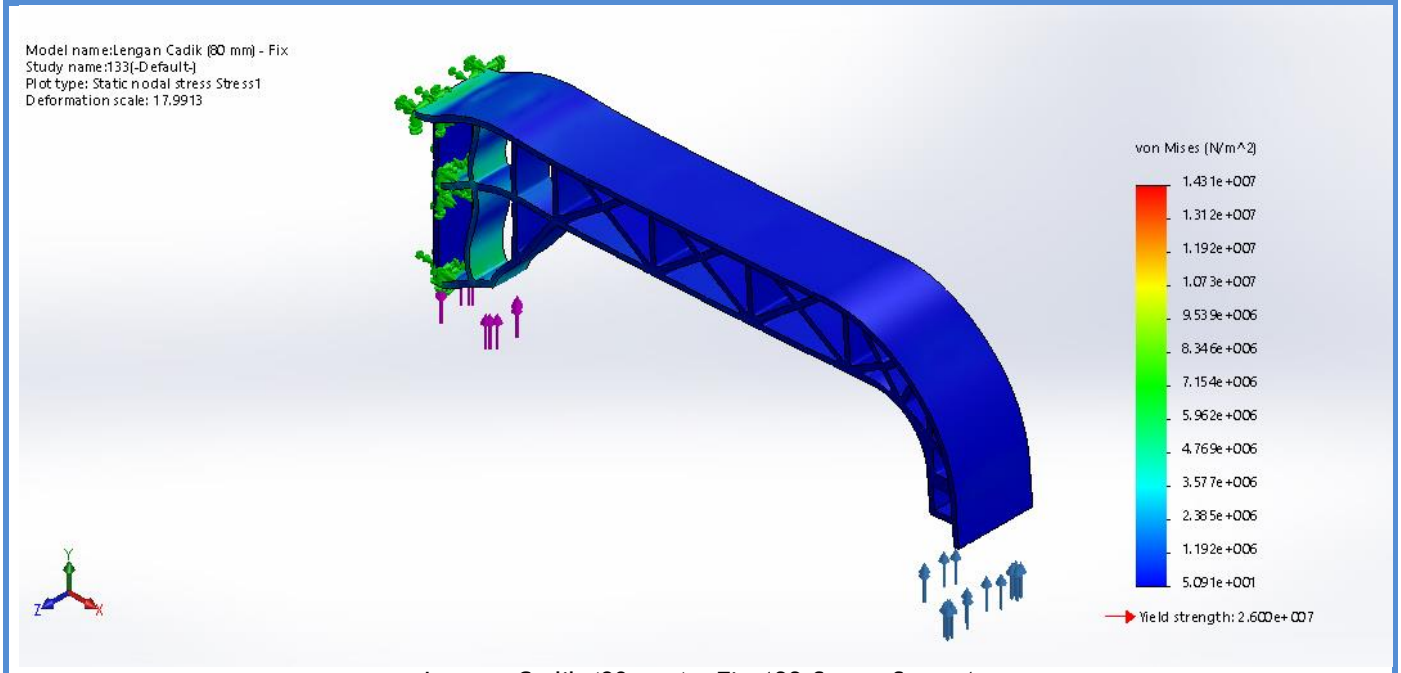
Mesh information - Details

Total Nodes	24037
Total Elements	11768
Maximum Aspect Ratio	17.868
% of elements with Aspect Ratio < 3	72.6
% of elements with Aspect Ratio > 10	0.544
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



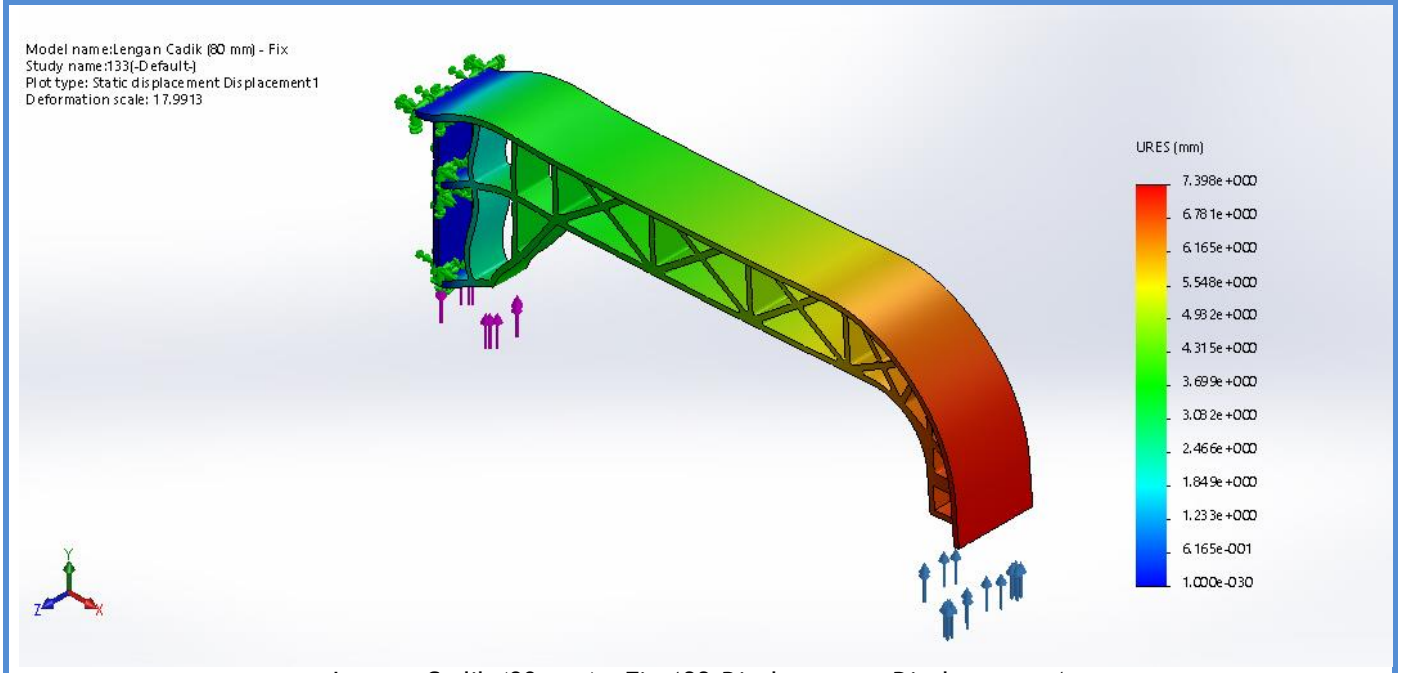
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	5.091e+001N/m^2 Node: 10933	1.431e+007N/m^2 Node: 3646



Lengan Cadik (80 mm) - Fix-133-Stress-Stress1

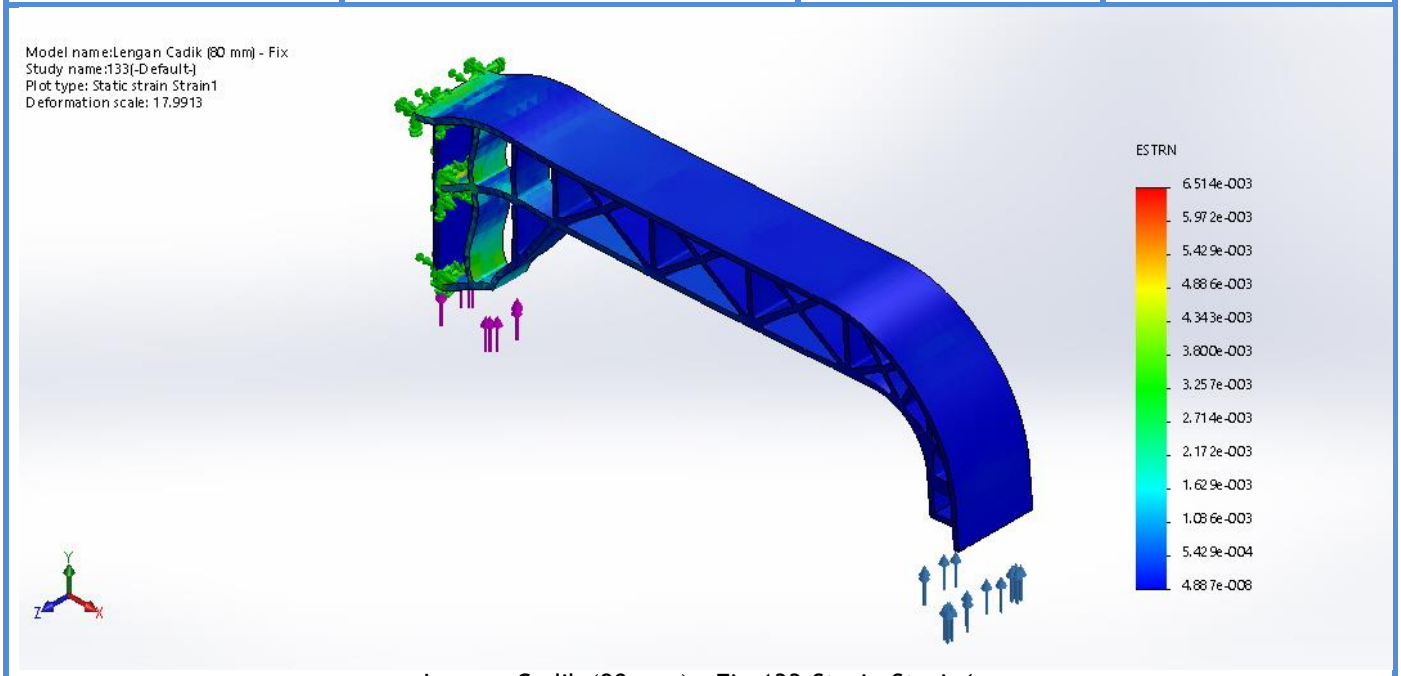
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 449	7.398e+000mm Node: 1063



Lengan Cadik (80 mm) - Fix-133-Displacement-Displacement1

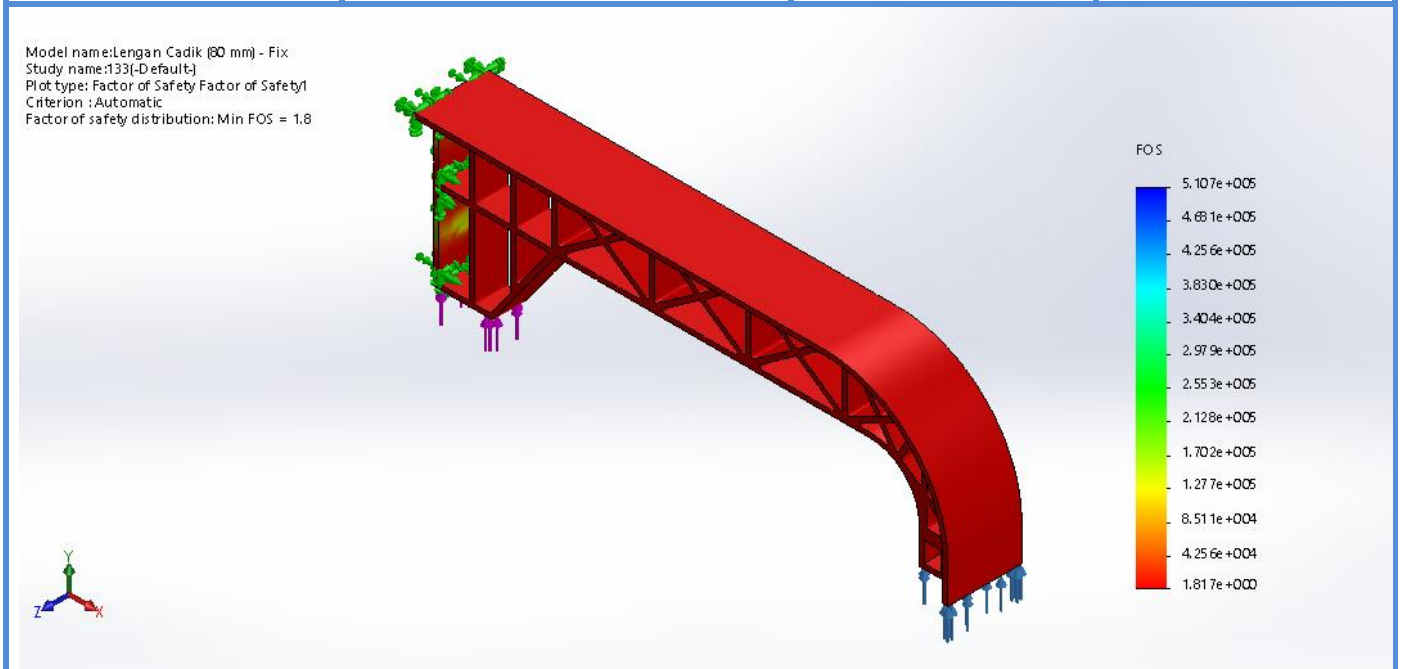
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	4.887e-008 Element: 9230	6.514e-003 Element: 6130

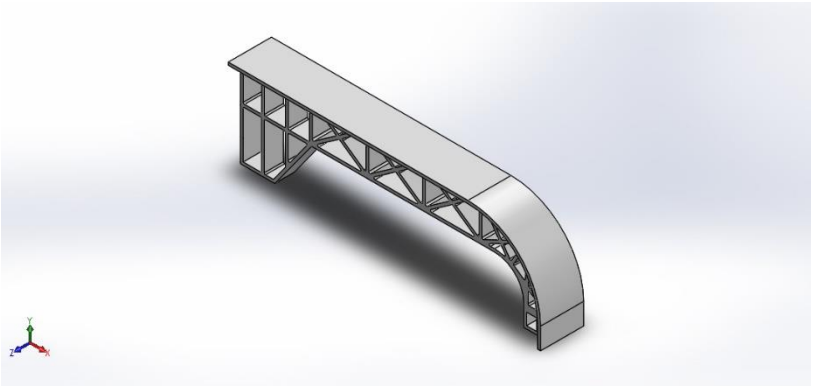


Lengan Cadik (80 mm) - Fix-133-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.817e+000 Node: 3646	5.107e+005 Node: 10933



Lengan Cadik (80 mm) - Fix-133-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (80 mm) - Fix

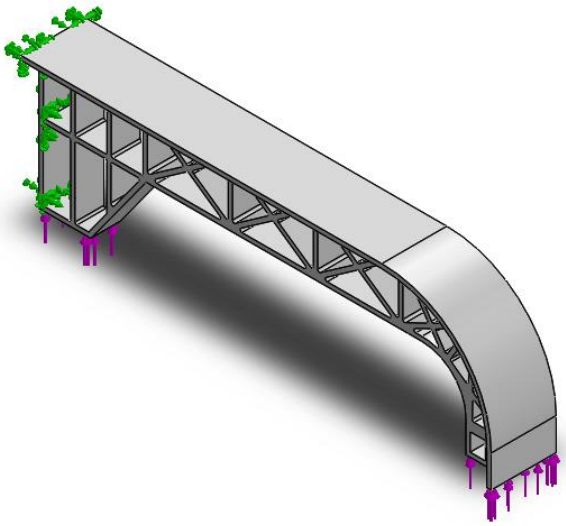
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 361
Analysis type: Static

Table of Contents

Description

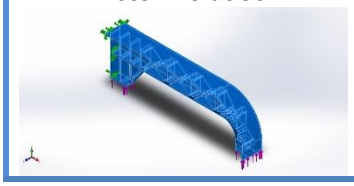
No Data

Model Information



Model name: Lengan Cadik (80 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude6 	Solid Body	**Mass:8.97192 kg** **Volume:0.00942429 m^3** **Density:952 kg/m^3** **Weight:87.9248 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (80 mm) - Fix.SLDPRT** Jul 09 07:04:48 2018

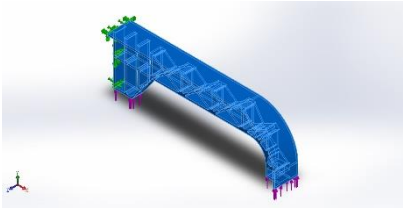
Study Properties

Study name	361
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

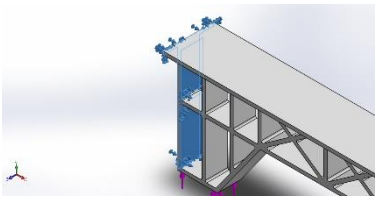
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

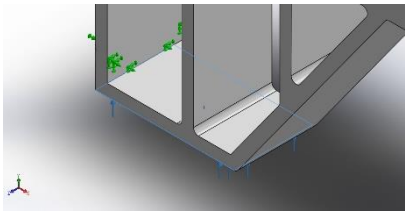
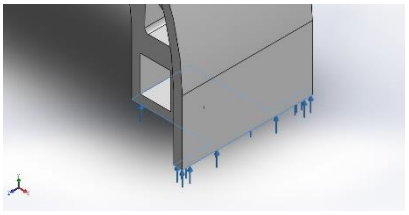
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude6)(Lengan Cadik (80 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	1.78581	-2611.07	0.00210953	2611.07
Reaction Moment(N.m)	0	0	0	0

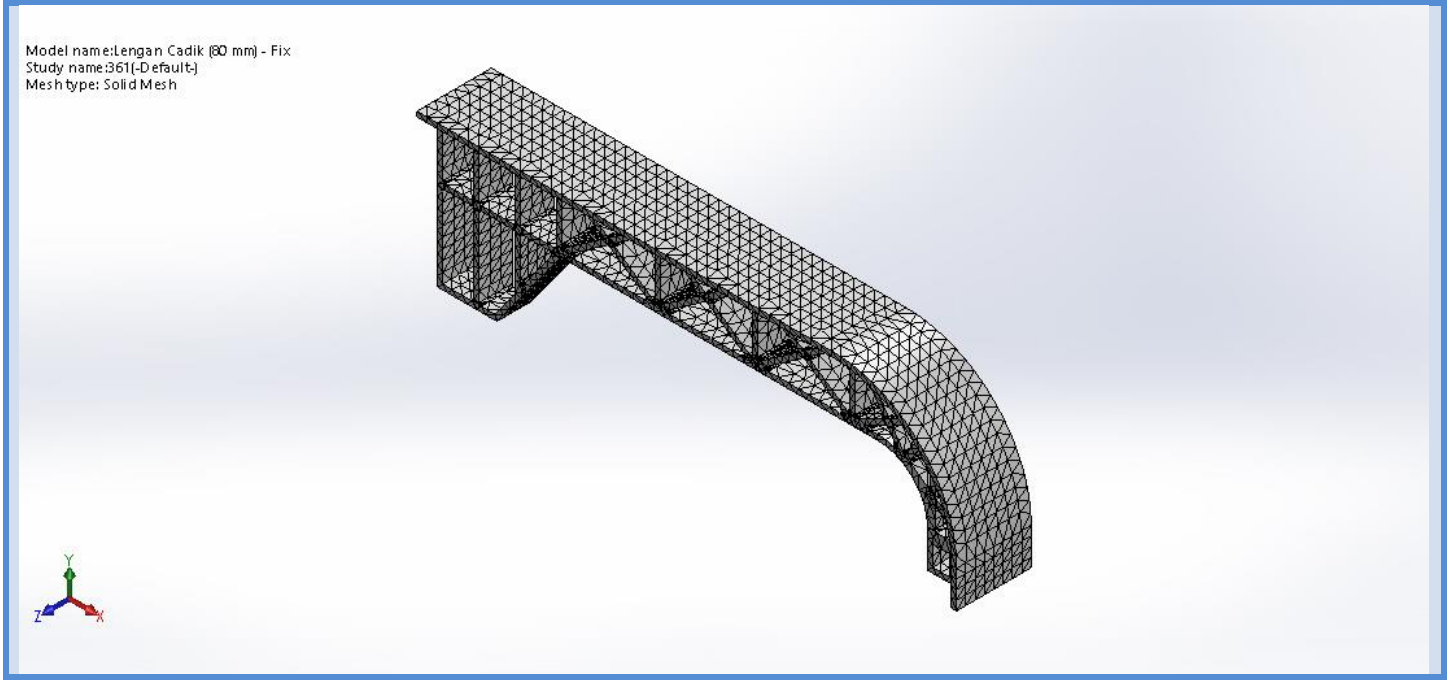
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 361.76 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	25.0962 mm
Tolerance	1.25481 mm
Mesh Quality Plot	High

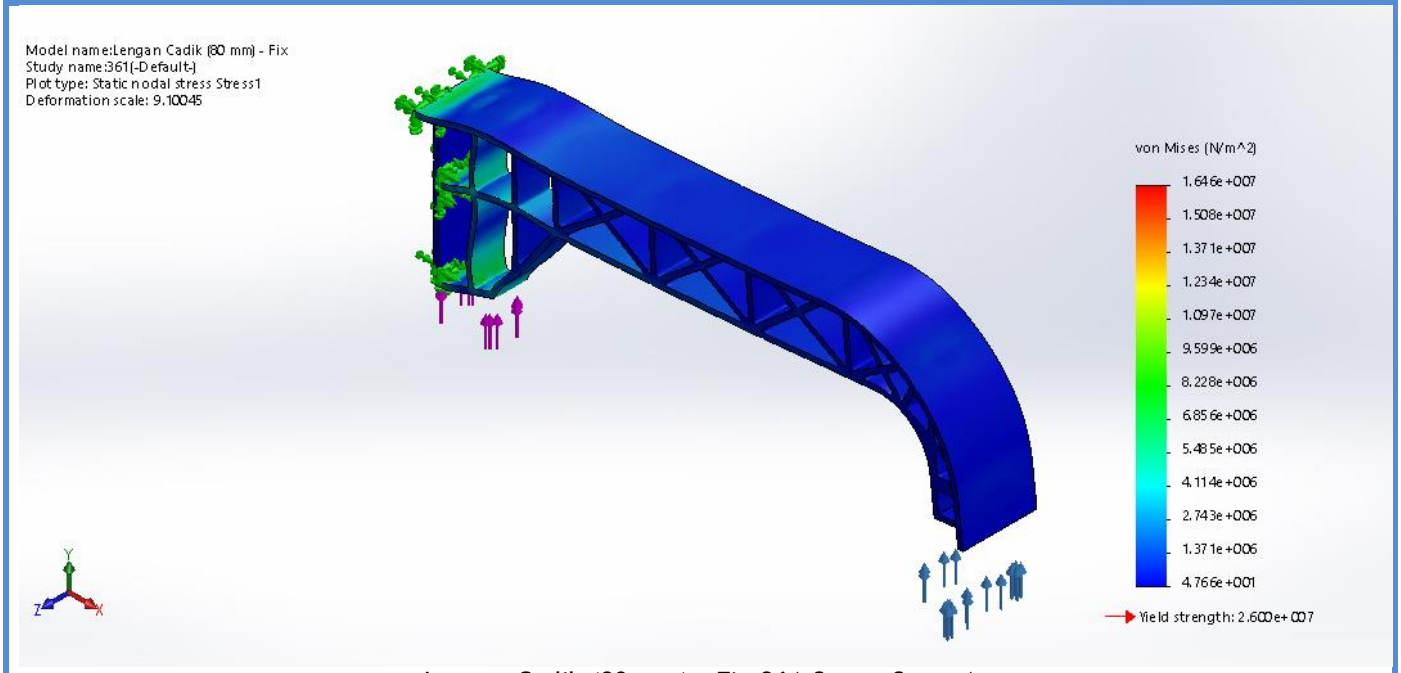
Mesh information - Details

Total Nodes	24037
Total Elements	11768
Maximum Aspect Ratio	17.868
% of elements with Aspect Ratio < 3	72.6
% of elements with Aspect Ratio > 10	0.544
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



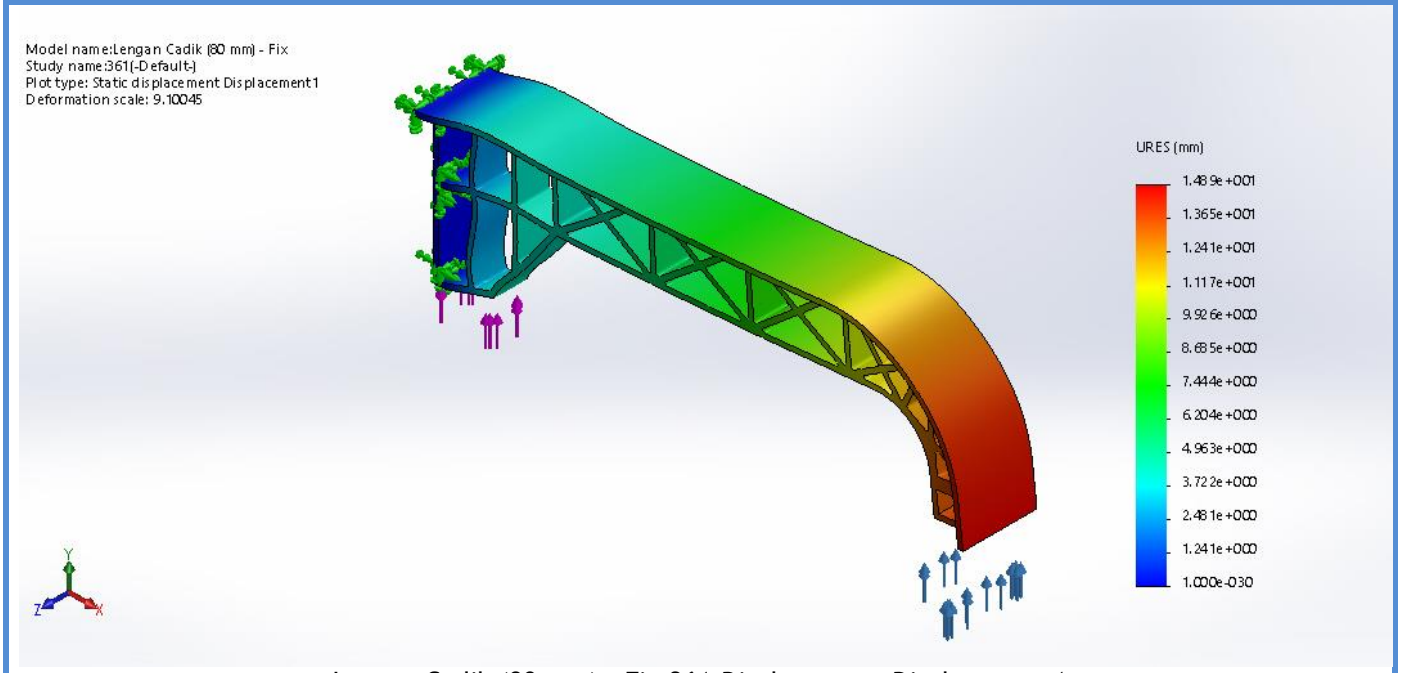
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	4.766e+001N/m^2 Node: 10946	1.646e+007N/m^2 Node: 3646



Lengan Cadik (80 mm) - Fix-361-Stress-Stress1

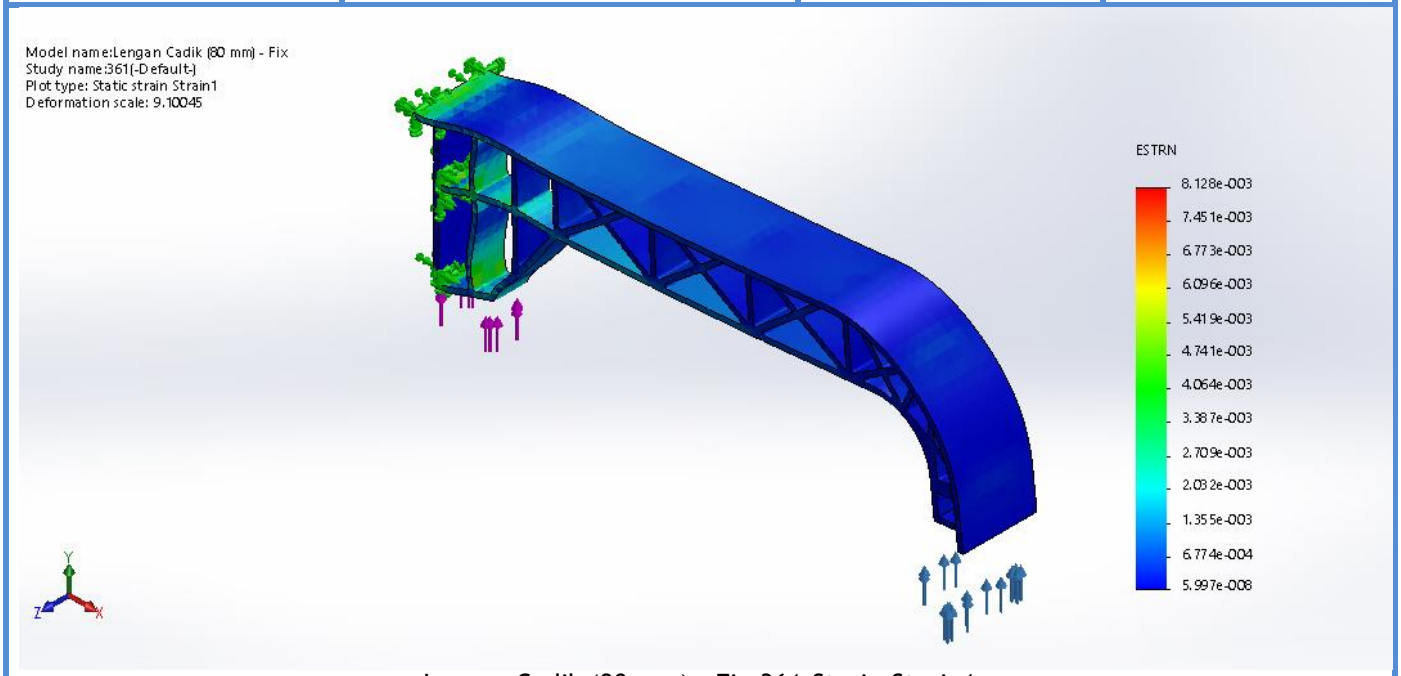
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 449	1.489e+001mm Node: 1064



Lengan Cadik (80 mm) - Fix-361-Displacement-Displacement1

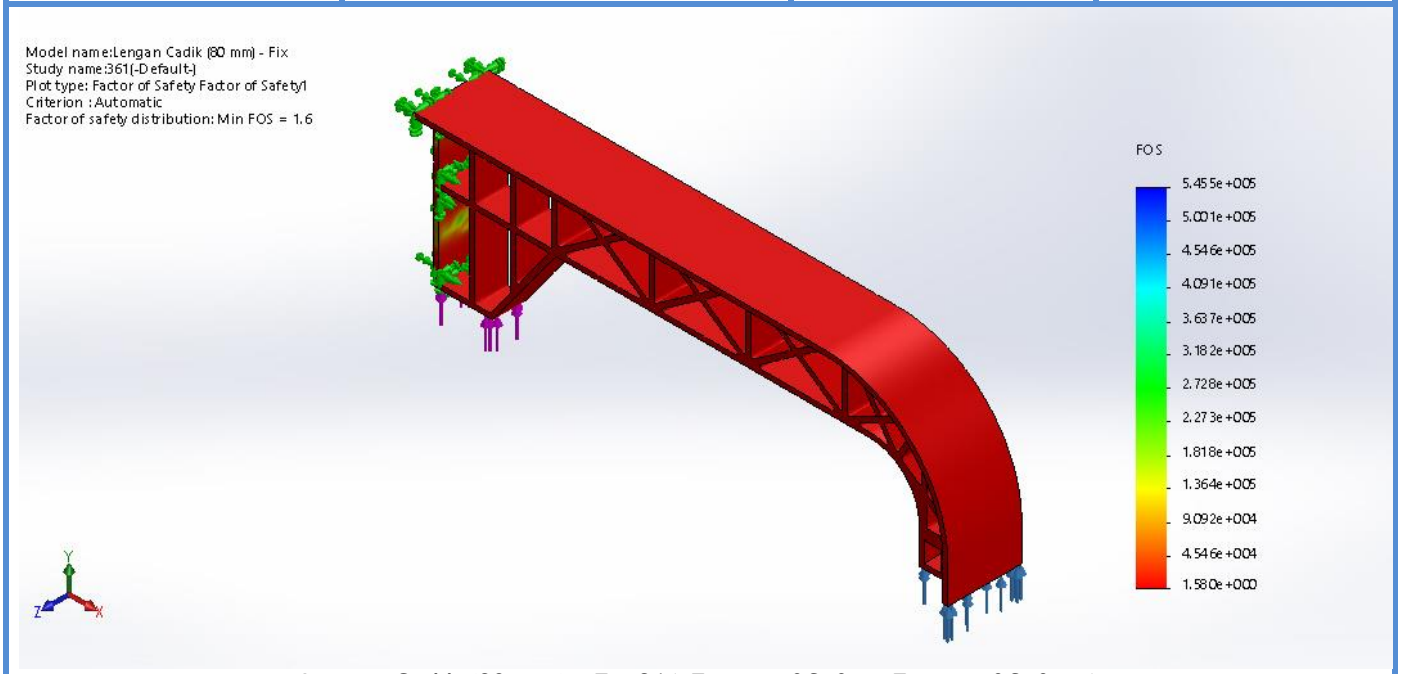
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	5.997e-008 Element: 3328	8.128e-003 Element: 338



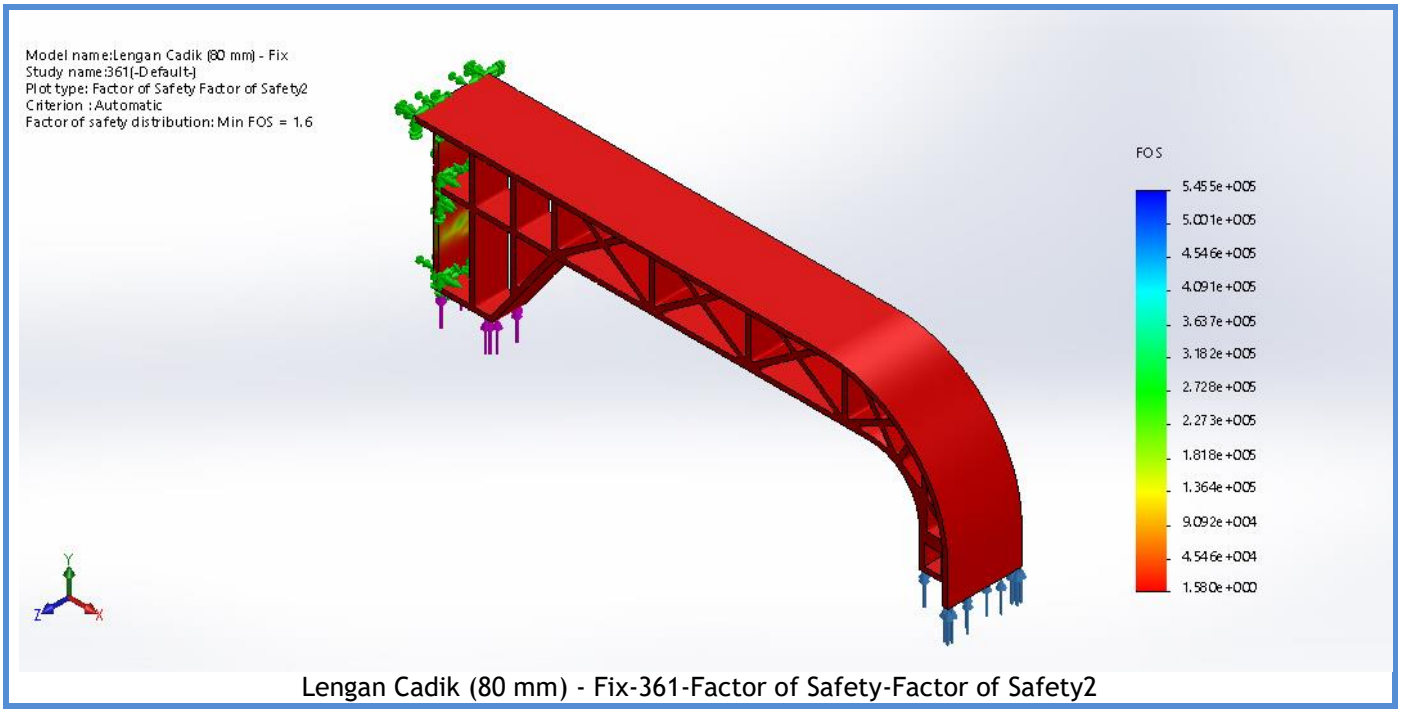
Lengan Cadik (80 mm) - Fix-361-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.580e+000 Node: 3646	5.455e+005 Node: 10946

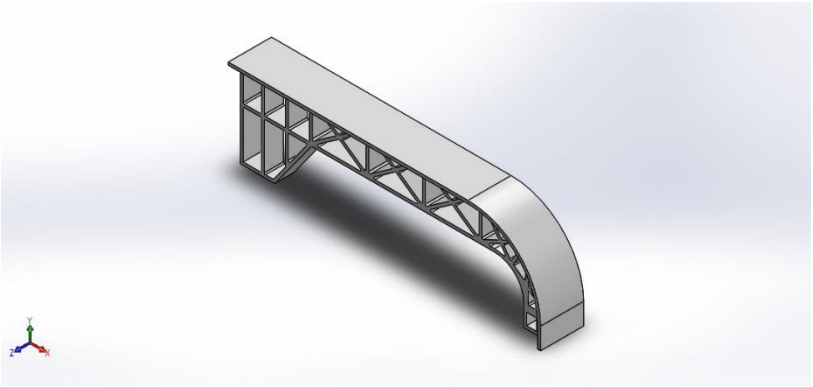


Lengan Cadik (80 mm) - Fix-361-Factor of Safety-Factor of Safety1

Name	Type	Min	Max
Factor of Safety2	Automatic	1.580e+000 Node: 3646	5.455e+005 Node: 10946



Lengan Cadik (80 mm) - Fix-361-Factor of Safety-Factor of Safety2



Simulation of Lengan Cadik (80 mm) - Fix

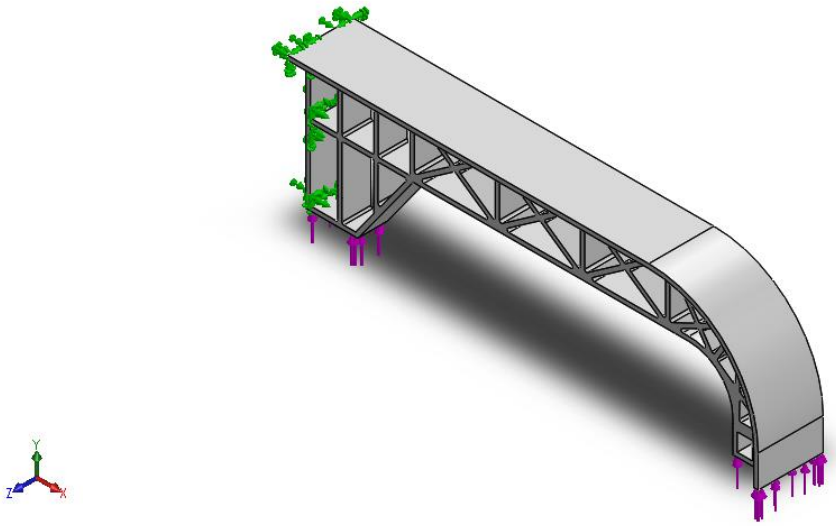
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 633
Analysis type: Static

Table of Contents

Description

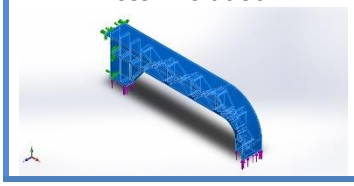
No Data

Model Information



Model name: Lengan Cadik (80 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude6 	Solid Body	**Mass:8.97192 kg** **Volume:0.00942429 m^3** **Density:952 kg/m^3** **Weight:87.9248 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (80 mm) - Fix.SLDPRT** Jul 09 07:04:48 2018

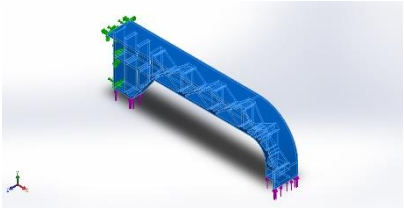
Study Properties

Study name	633
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

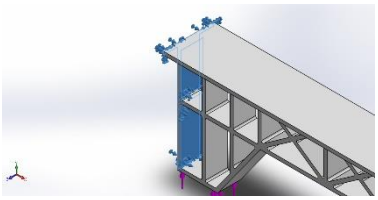
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

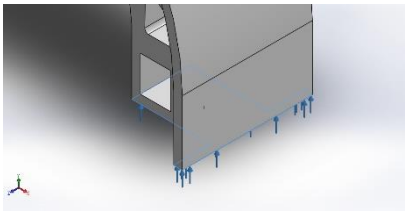
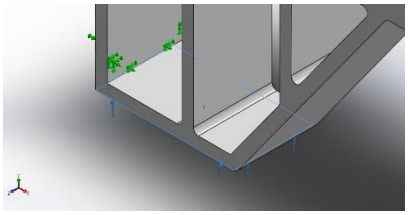
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude6)(Lengan Cadik (80 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	0.925659	-2884.12	-0.304394	2884.12
Reaction Moment(N.m)	0	0	0	0

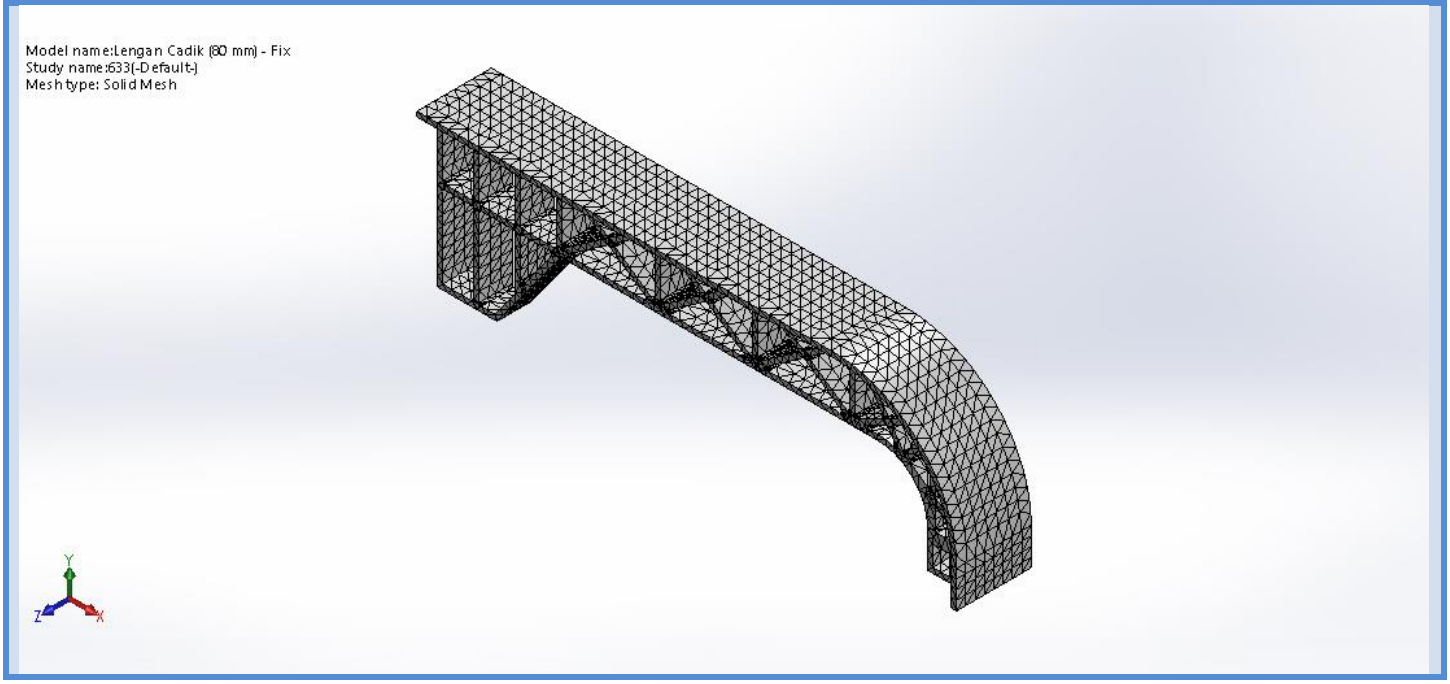
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 633.36 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	25.0962 mm
Tolerance	1.25481 mm
Mesh Quality Plot	High

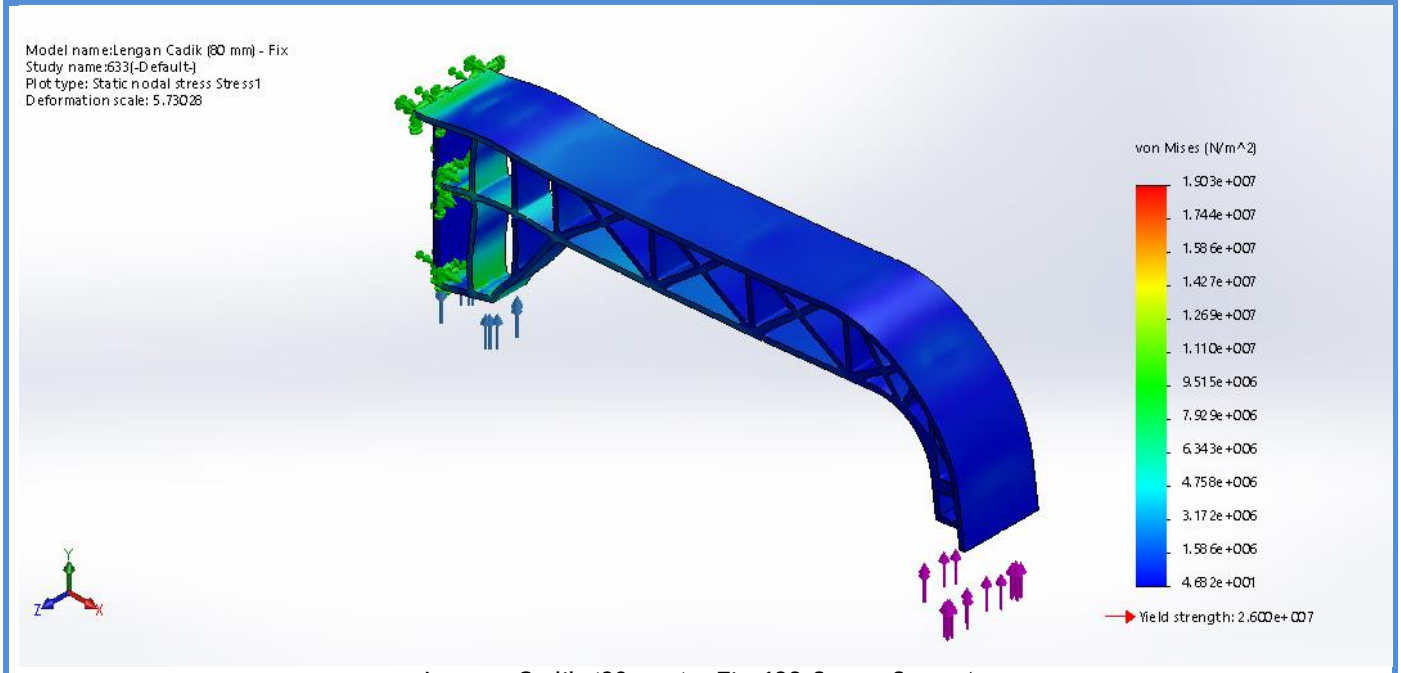
Mesh information - Details

Total Nodes	24037
Total Elements	11768
Maximum Aspect Ratio	17.868
% of elements with Aspect Ratio < 3	72.6
% of elements with Aspect Ratio > 10	0.544
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:03
Computer name:	



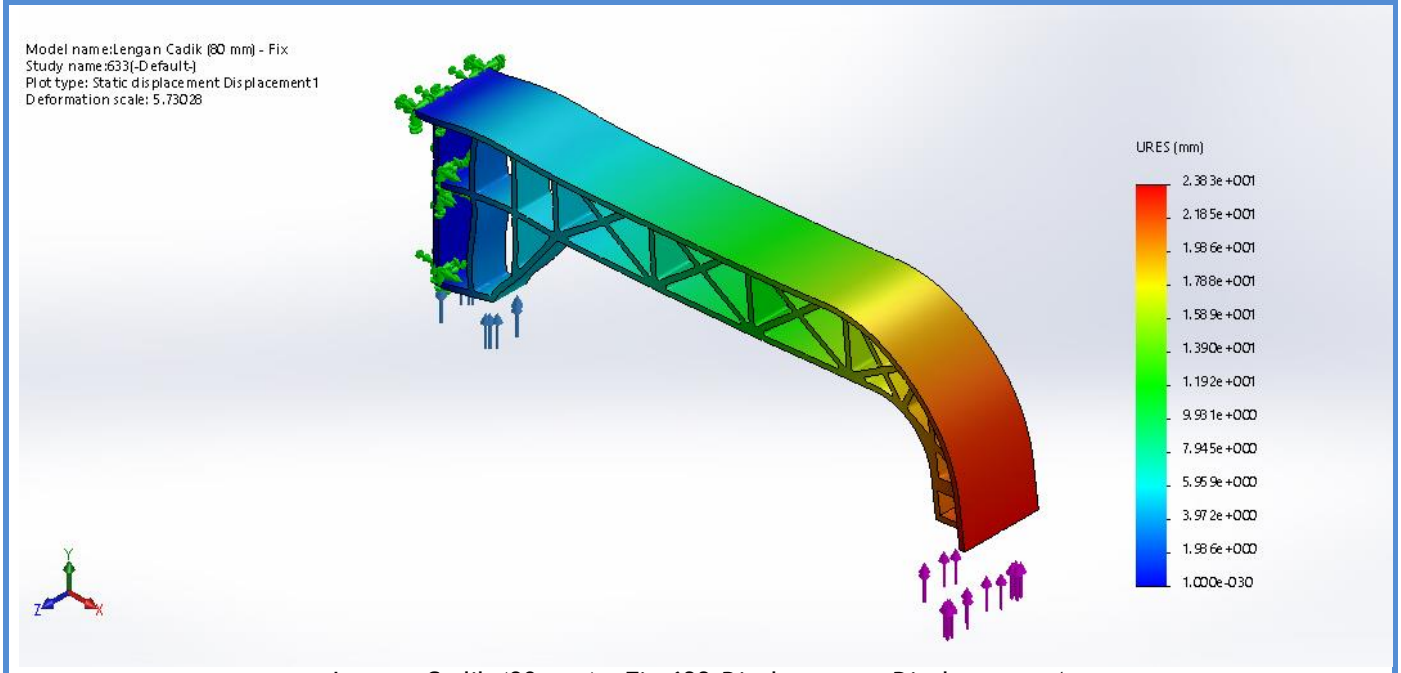
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	4.682e+001N/m^2 Node: 11055	1.903e+007N/m^2 Node: 3646



Lengan Cadik (80 mm) - Fix-633-Stress-Stress1

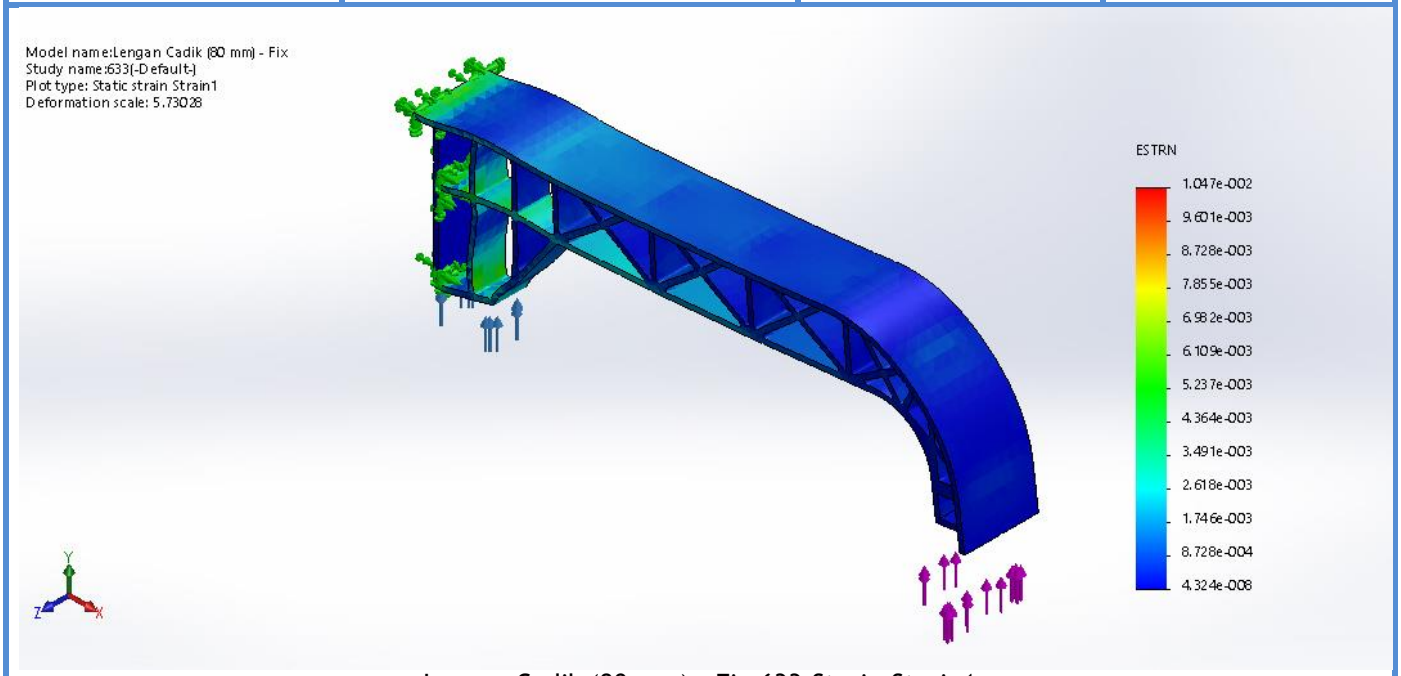
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 449	2.383e+001mm Node: 1064



Lengan Cadik (80 mm) - Fix-633-Displacement-Displacement1

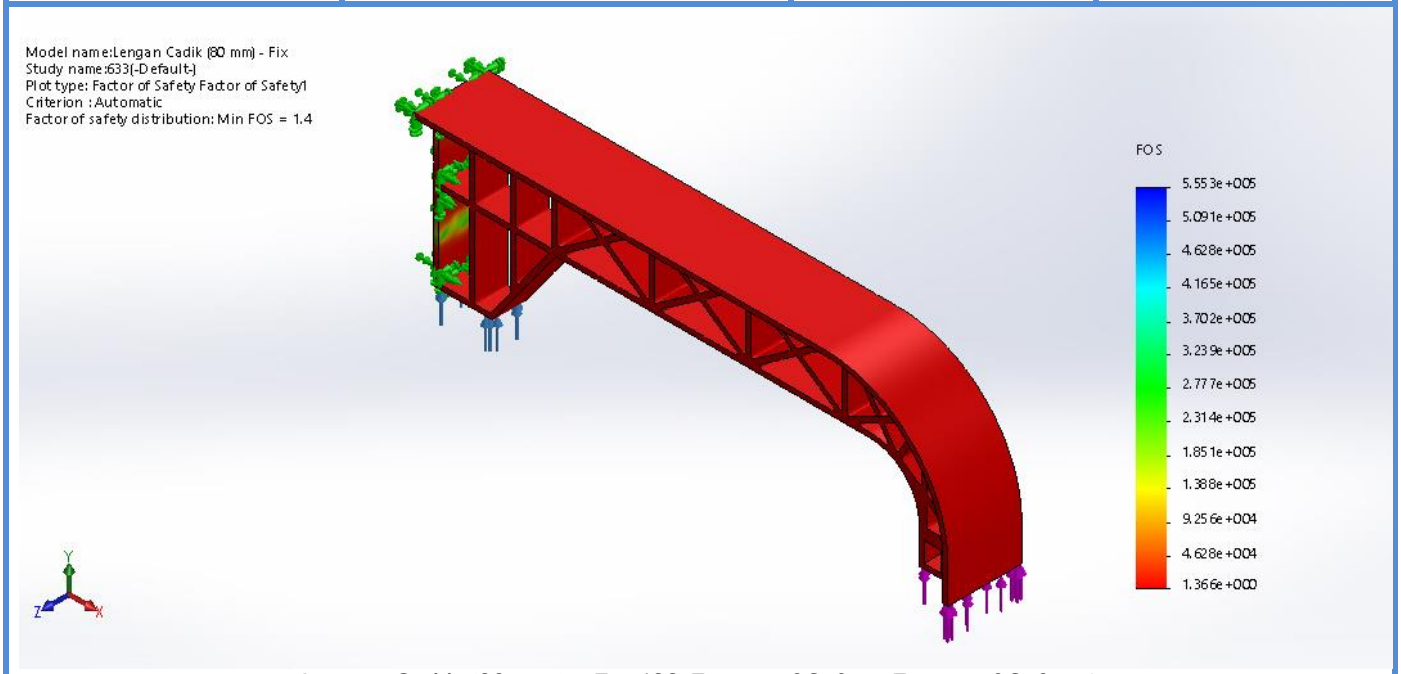
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	4.324e-008 Element: 3664	1.047e-002 Element: 338

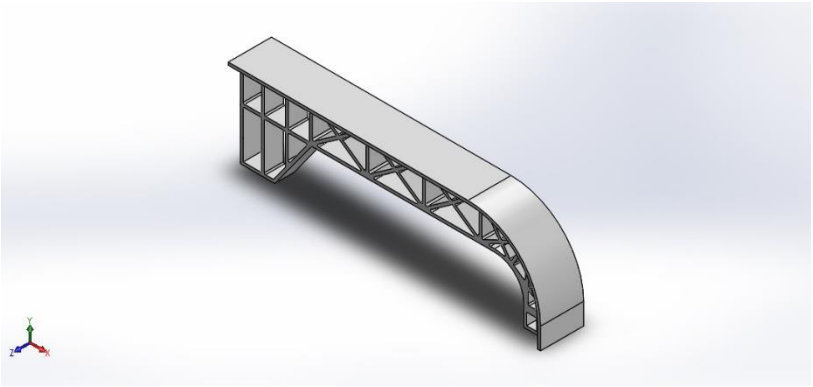


Lengan Cadik (80 mm) - Fix-633-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.366e+000 Node: 3646	5.553e+005 Node: 11055



Lengan Cadik (80 mm) - Fix-633-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (80 mm) - Fix

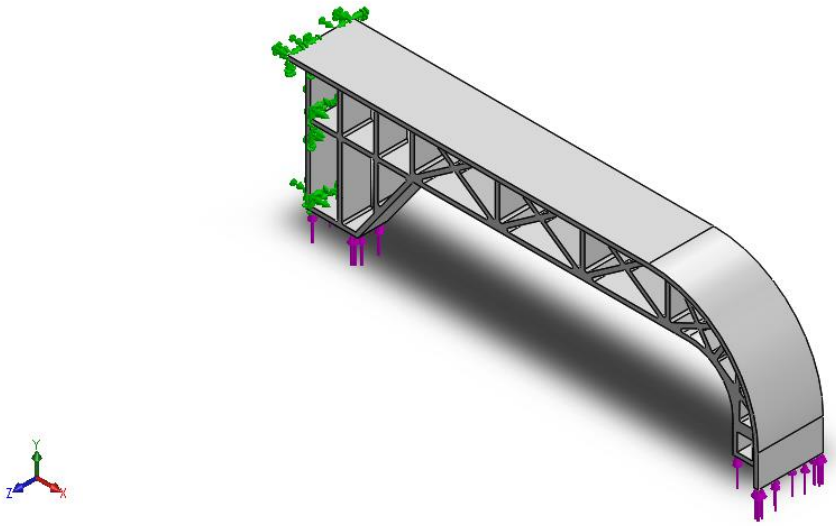
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 916
Analysis type: Static

Table of Contents

Description

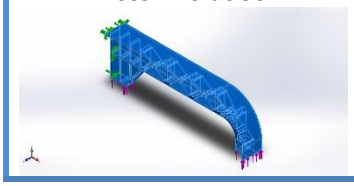
No Data

Model Information



Model name: Lengan Cadik (80 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude6 	Solid Body	**Mass:8.97192 kg** **Volume:0.00942429 m^3** **Density:952 kg/m^3** **Weight:87.9248 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (80 mm) - Fix.SLDPRT** Jul 09 07:04:48 2018

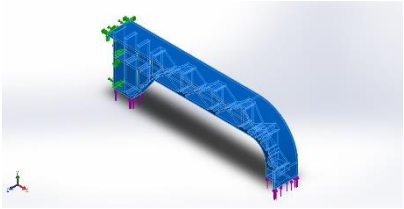
Study Properties

Study name	916
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

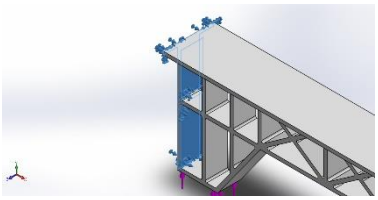
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

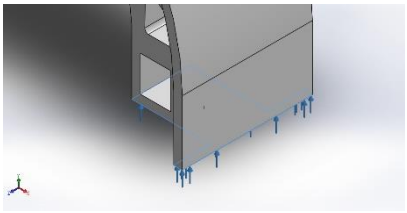
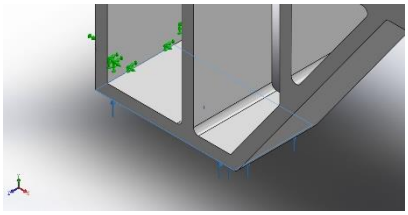
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude6)(Lengan Cadik (80 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-1.06189	-3166.56	0.108978	3166.56
Reaction Moment(N.m)	0	0	0	0

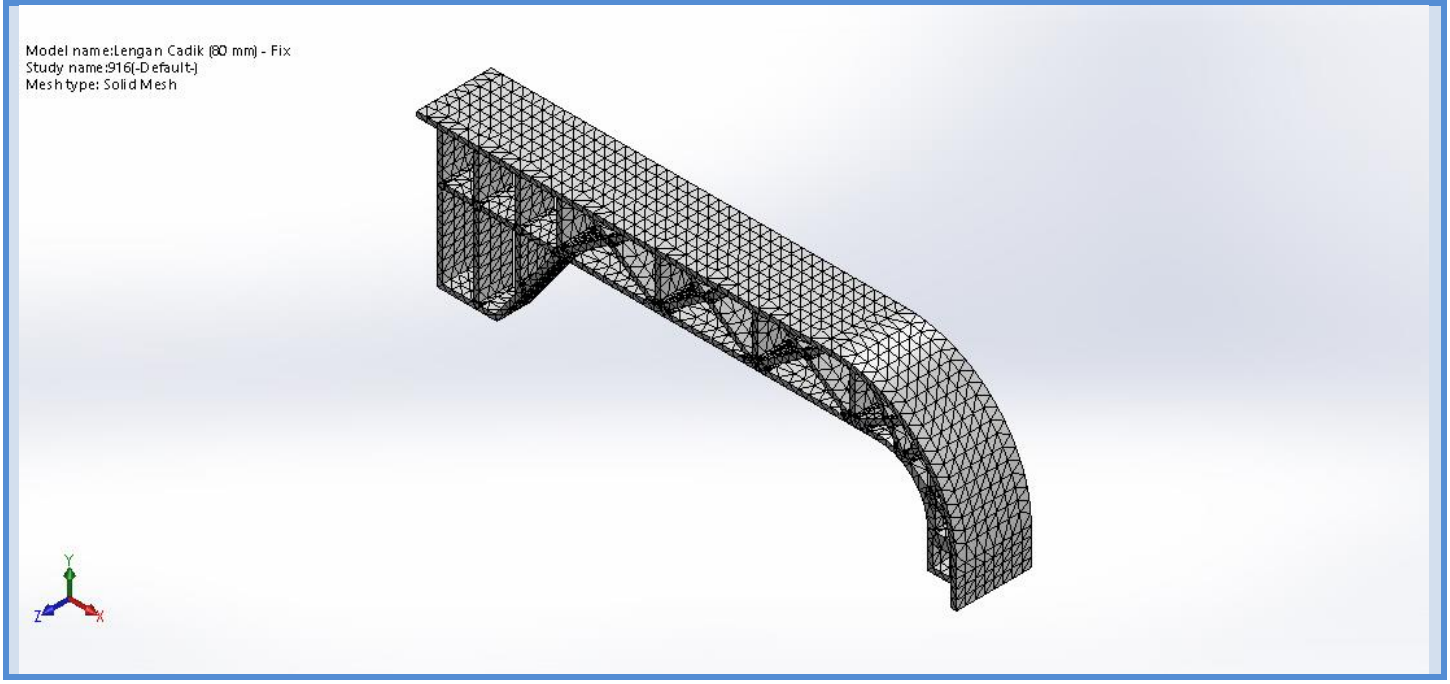
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 916.04 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	25.0962 mm
Tolerance	1.25481 mm
Mesh Quality Plot	High

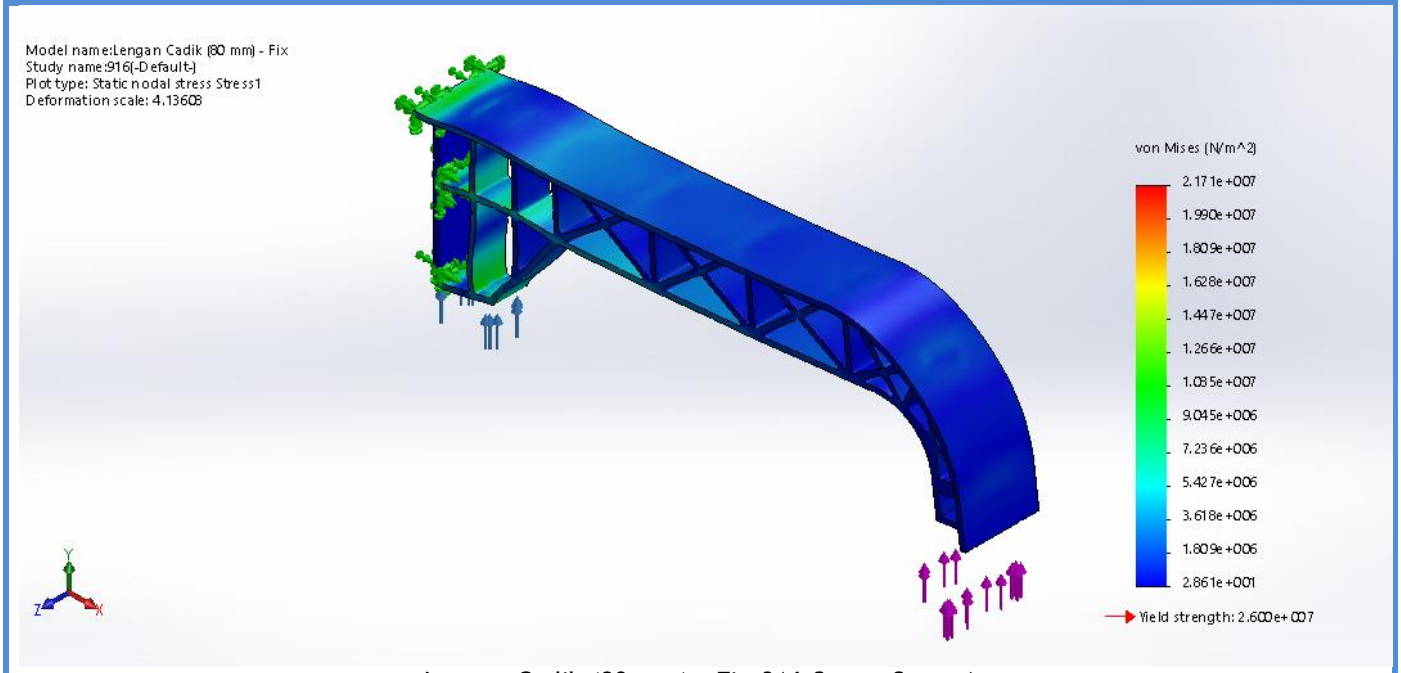
Mesh information - Details

Total Nodes	24037
Total Elements	11768
Maximum Aspect Ratio	17.868
% of elements with Aspect Ratio < 3	72.6
% of elements with Aspect Ratio > 10	0.544
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:03
Computer name:	



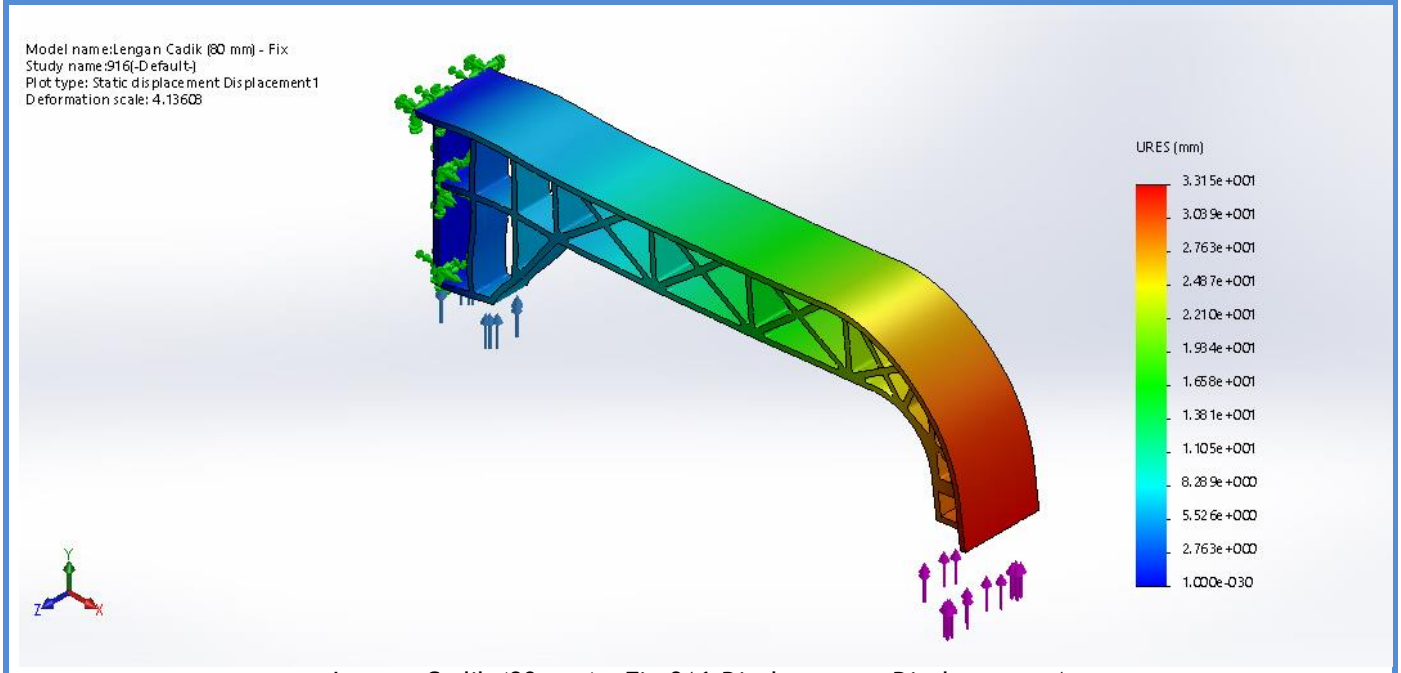
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	2.861e+001N/m^2 Node: 9481	2.171e+007N/m^2 Node: 3646



Lengan Cadik (80 mm) - Fix-916-Stress-Stress1

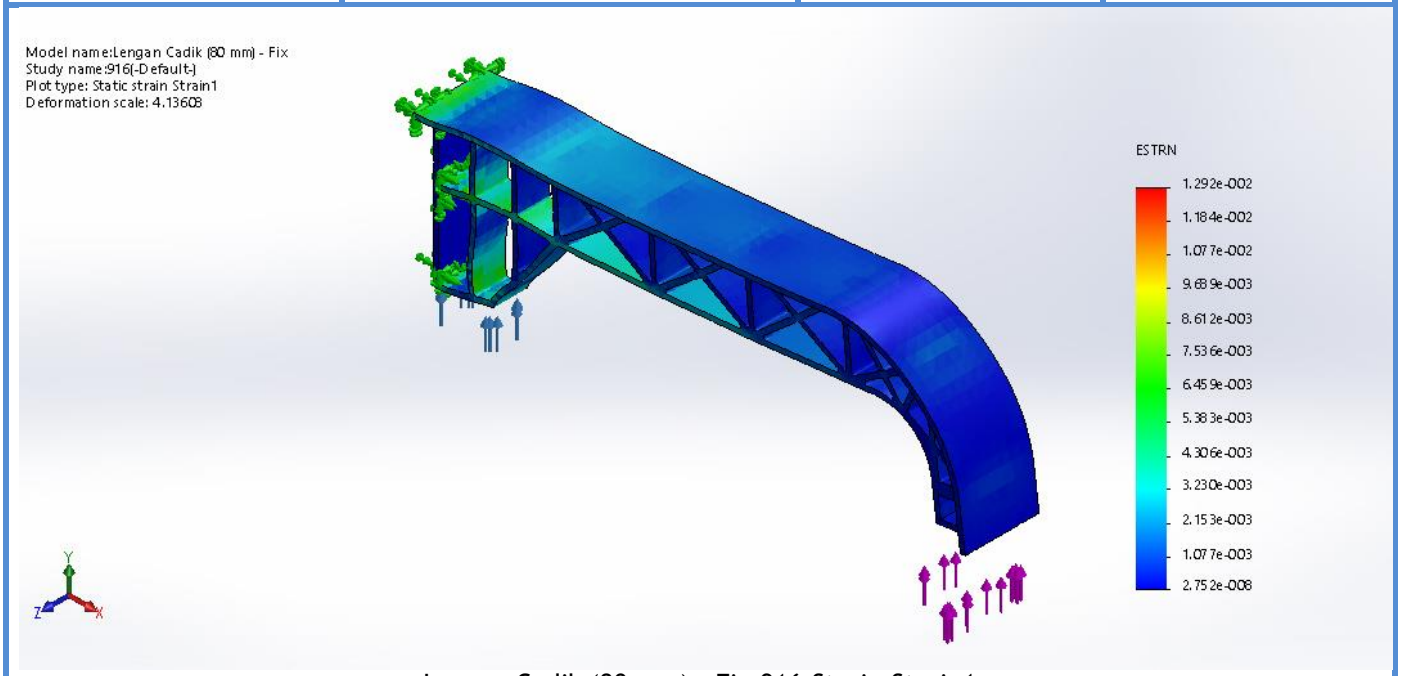
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 449	3.315e+001mm Node: 1064



Lengan Cadik (80 mm) - Fix-916-Displacement-Displacement1

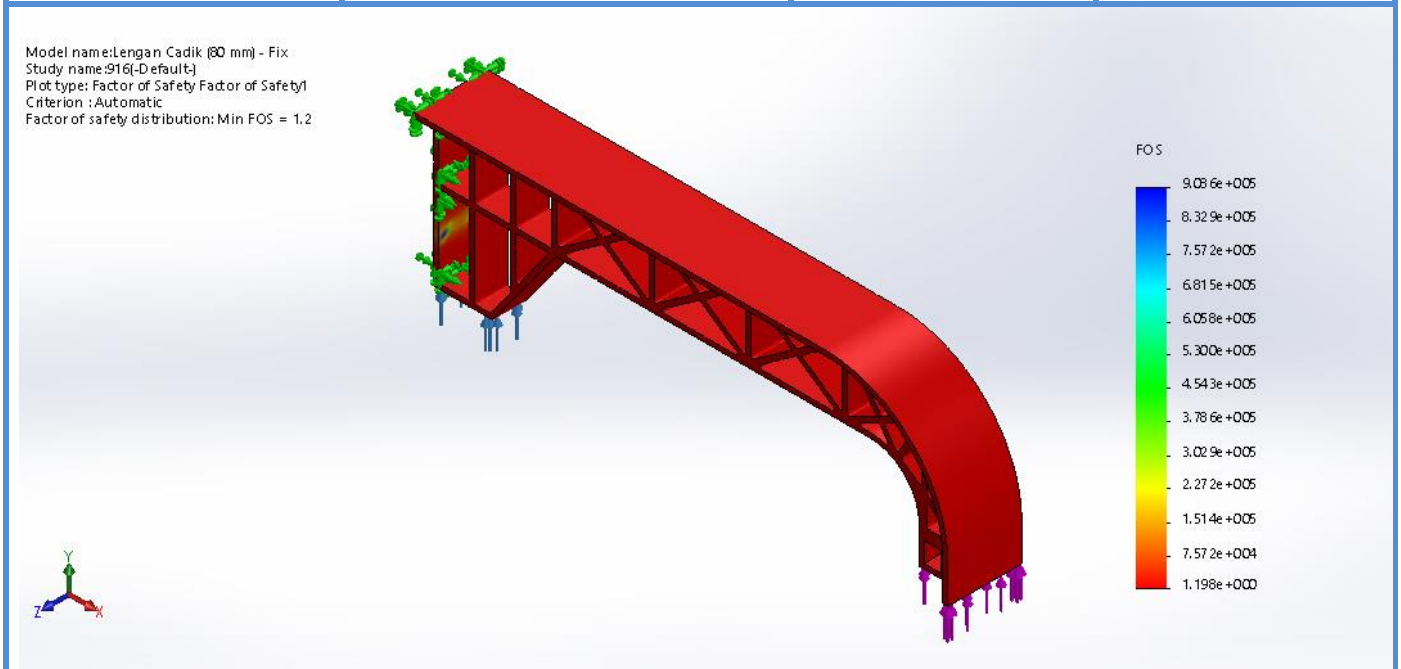
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	2.752e-008 Element: 3307	1.292e-002 Element: 338

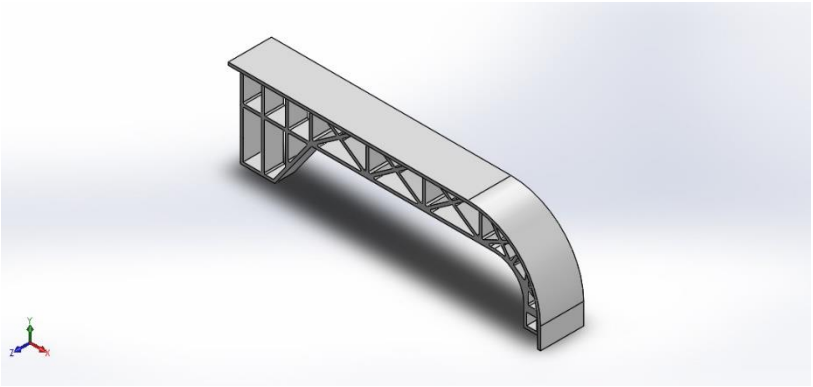


Lengan Cadik (80 mm) - Fix-916-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.198e+000 Node: 3646	9.086e+005 Node: 9481



Lengan Cadik (80 mm) - Fix-916-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (80 mm) - Fix

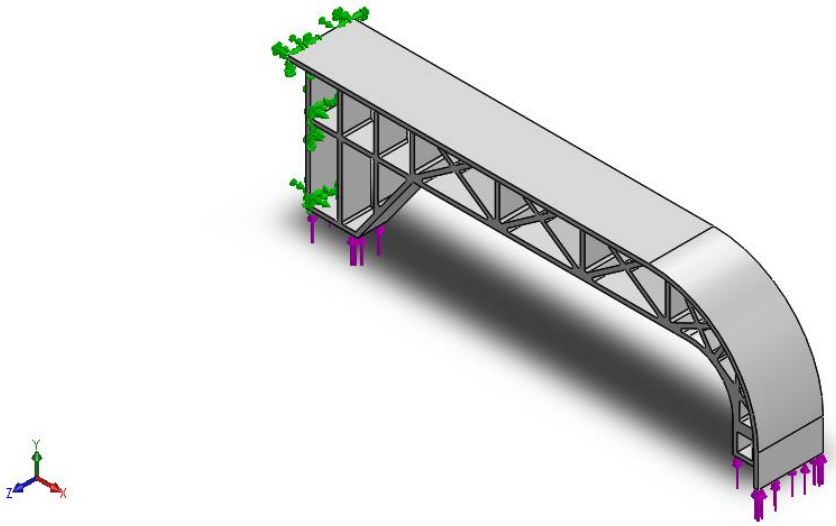
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 1213
Analysis type: Static

Table of Contents

Description

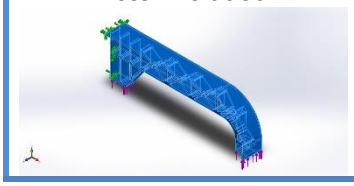
No Data

Model Information



Model name: Lengan Cadik (80 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude6 	Solid Body	**Mass:8.97192 kg** **Volume:0.00942429 m^3** **Density:952 kg/m^3** **Weight:87.9248 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (80 mm) - Fix.SLDPRT** Jul 09 07:04:48 2018

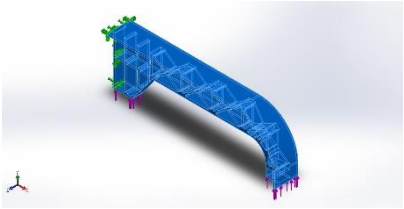
Study Properties

Study name	1213
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	On
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

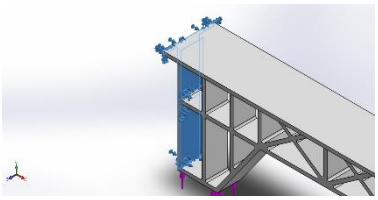
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

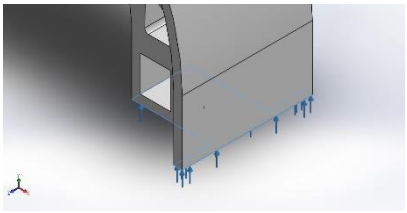
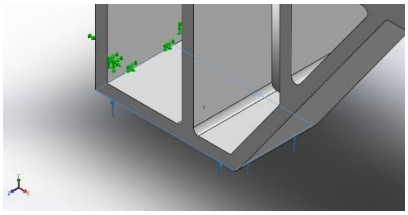
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude6)(Lengan Cadik (80 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-0.00476074	-3463.64	0.00971222	3463.64
Reaction Moment(N.m)	0	0	0	0

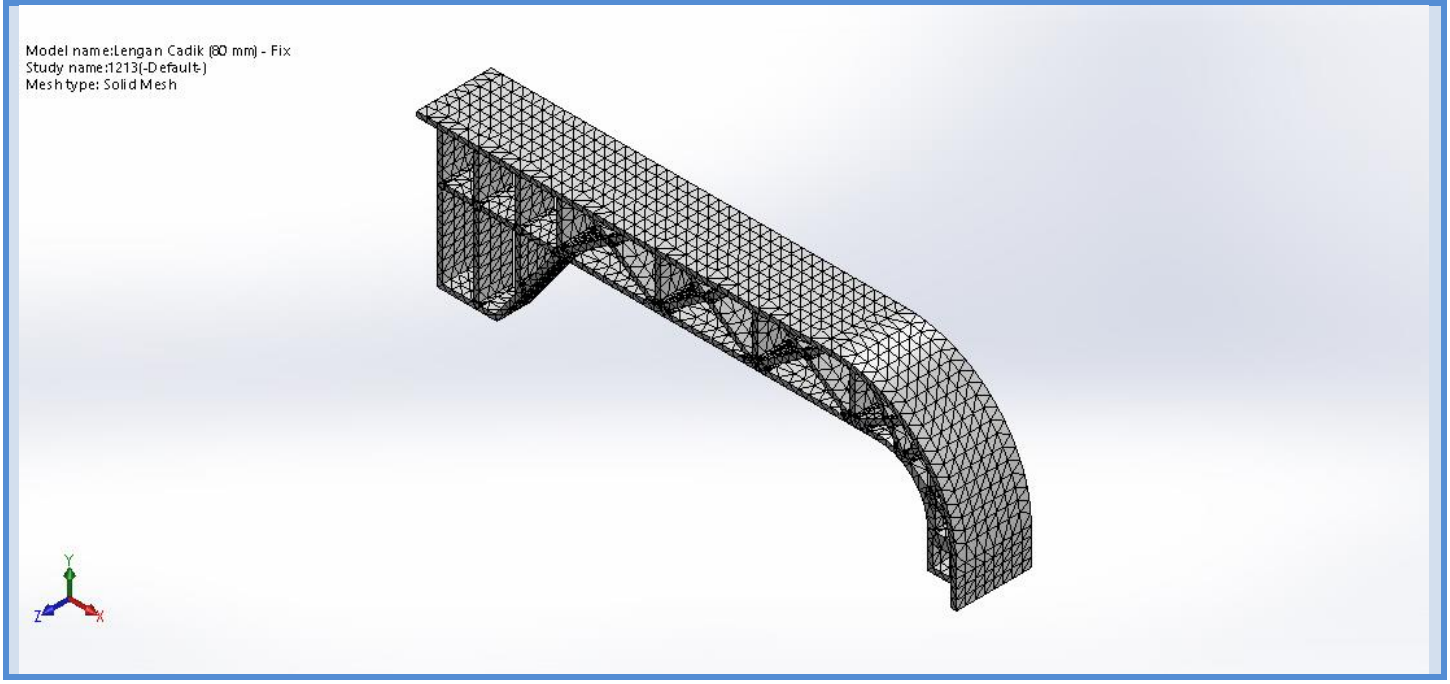
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 1213.18 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	25.0962 mm
Tolerance	1.25481 mm
Mesh Quality Plot	High

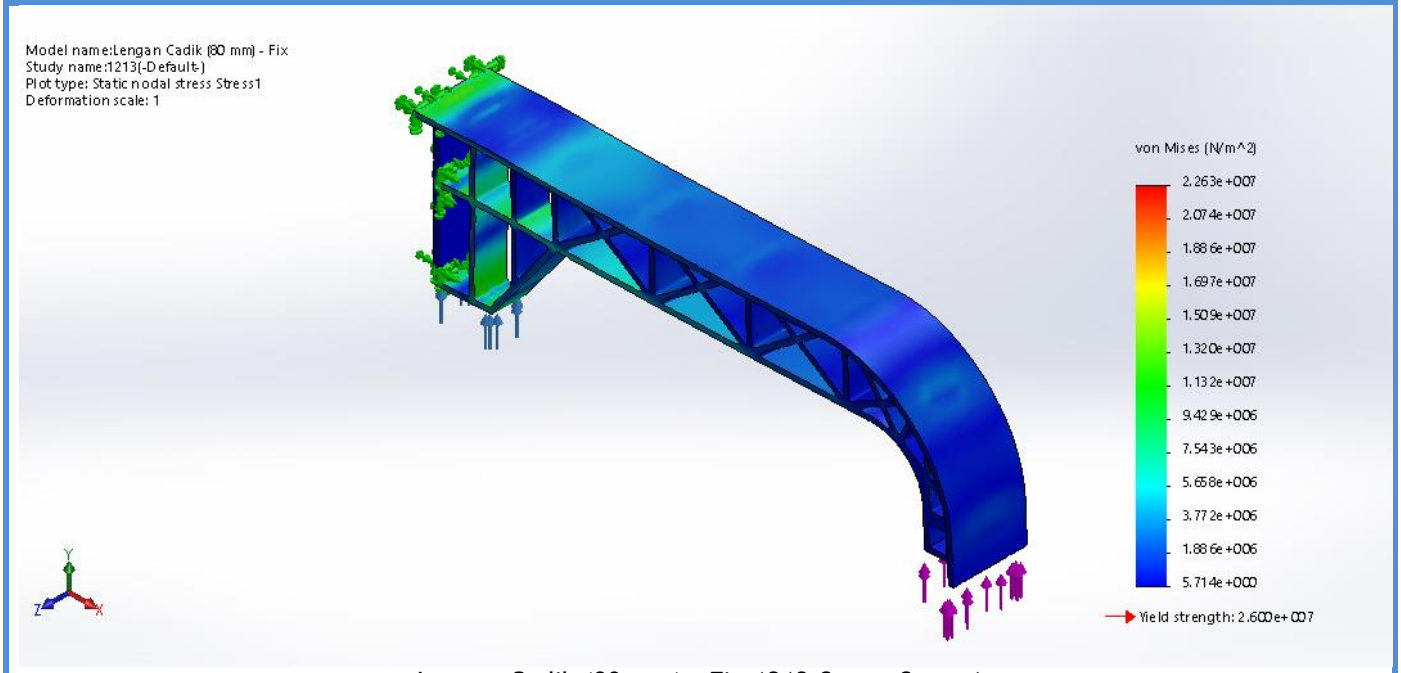
Mesh information - Details

Total Nodes	24037
Total Elements	11768
Maximum Aspect Ratio	17.868
% of elements with Aspect Ratio < 3	72.6
% of elements with Aspect Ratio > 10	0.544
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:03
Computer name:	



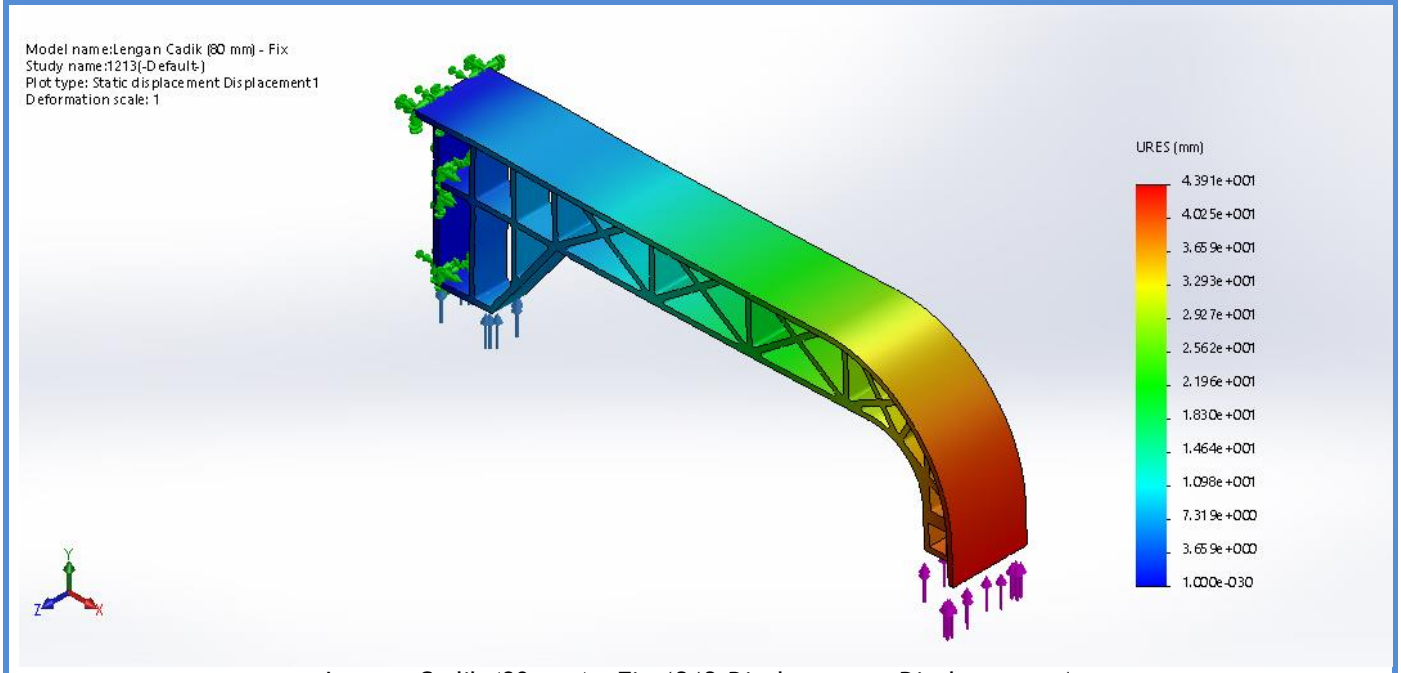
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	5.714e+000N/m^2 Node: 10941	2.263e+007N/m^2 Node: 3646



Lengan Cadik (80 mm) - Fix-1213-Stress-Stress1

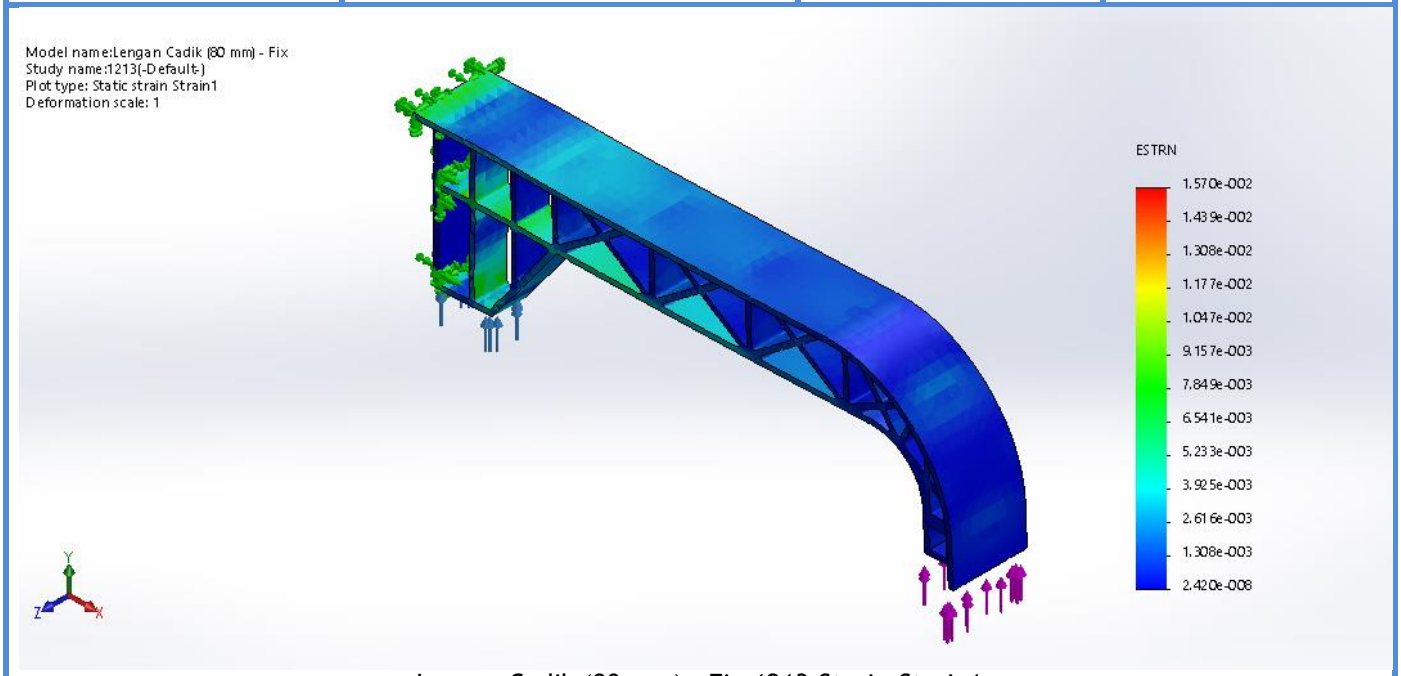
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 449	4.391e+001mm Node: 1064



Lengan Cadik (80 mm) - Fix-1213-Displacement-Displacement1

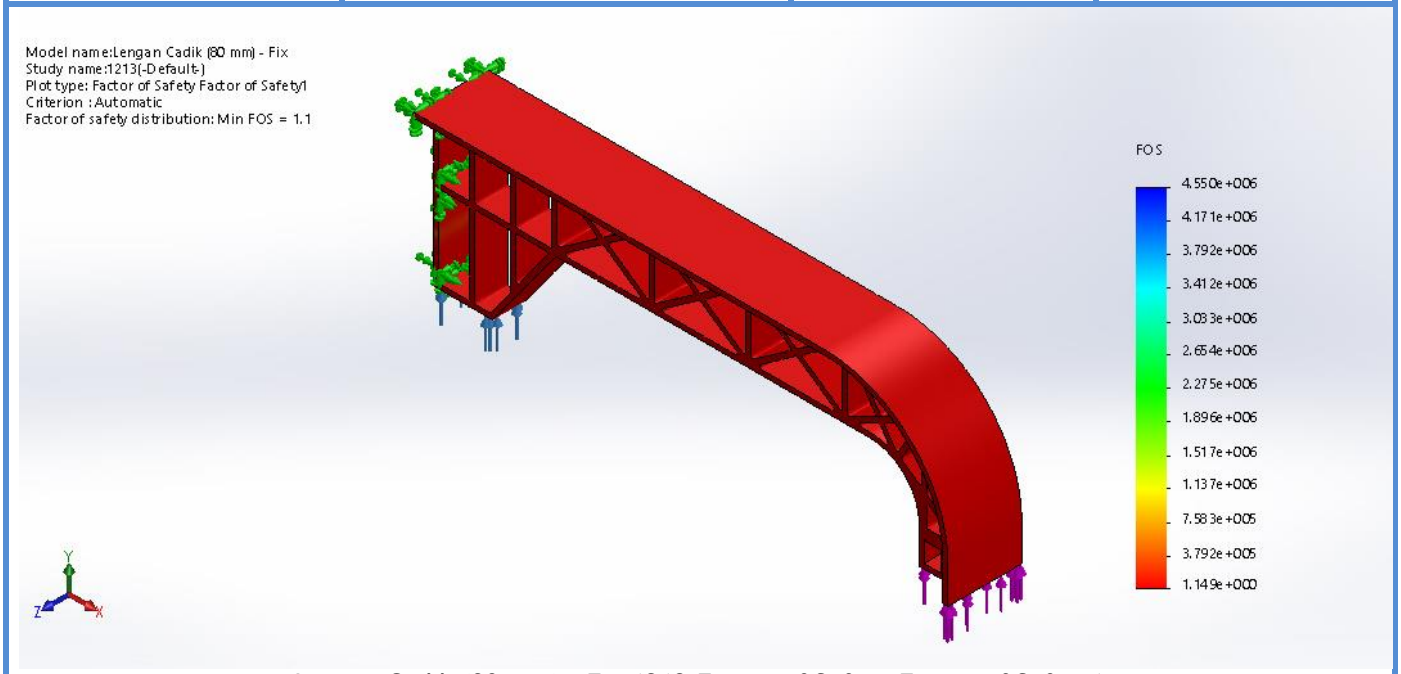
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	2.420e-008 Element: 3328	1.570e-002 Element: 338

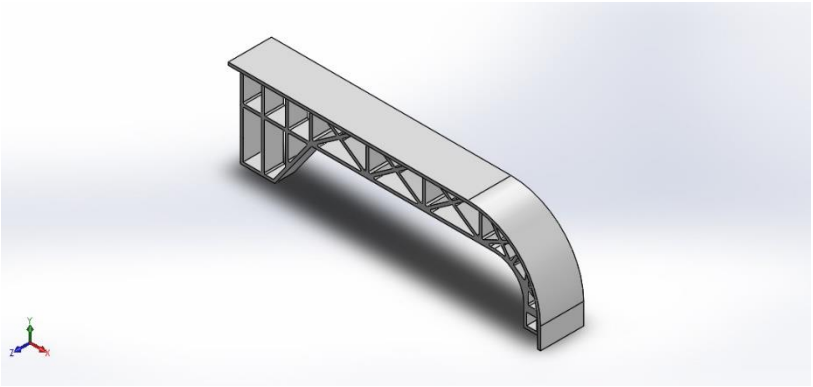


Lengan Cadik (80 mm) - Fix-1213-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.149e+000 Node: 3646	4.550e+006 Node: 10941



Lengan Cadik (80 mm) - Fix-1213-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (80 mm) - Fix

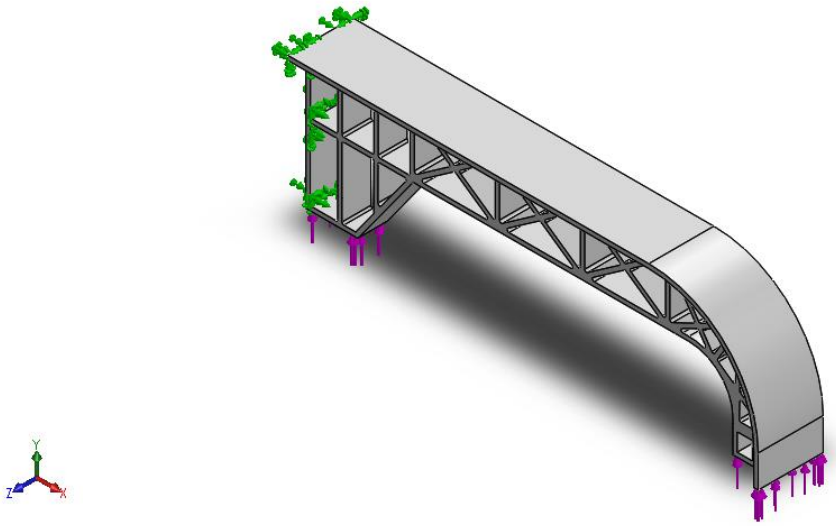
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 1482
Analysis type: Static

Table of Contents

Description

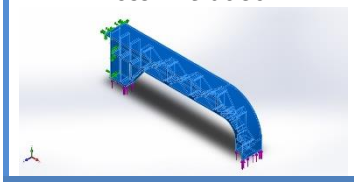
No Data

Model Information



Model name: Lengan Cadik (80 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude6 	Solid Body	**Mass:8.97192 kg** **Volume:0.00942429 m^3** **Density:952 kg/m^3** **Weight:87.9248 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (80 mm) - Fix.SLDPRT** Jul 09 07:04:48 2018

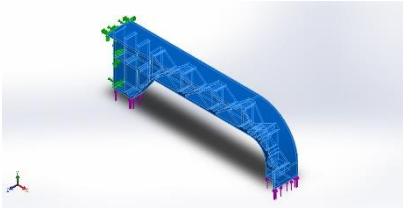
Study Properties

Study name	1482
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	On
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

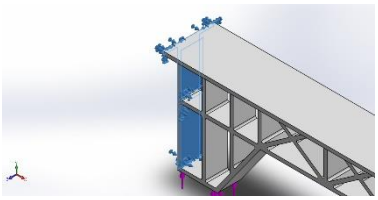
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

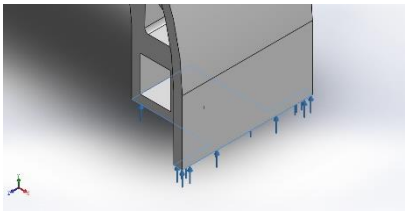
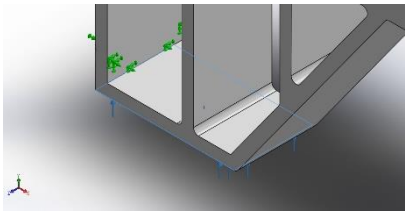
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude6)(Lengan Cadik (80 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-0.0819702	-3732.86	-0.104752	3732.86
Reaction Moment(N.m)	0	0	0	0

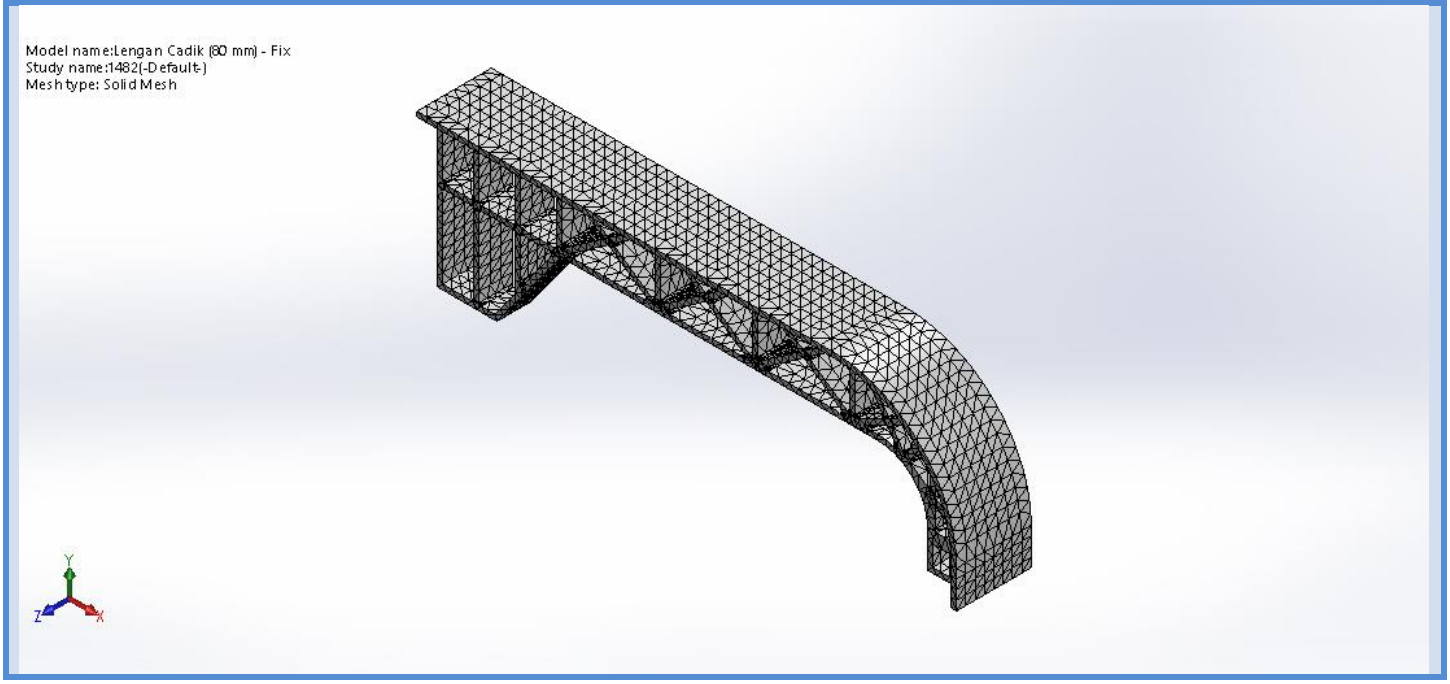
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 1482.27 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	25.0962 mm
Tolerance	1.25481 mm
Mesh Quality Plot	High

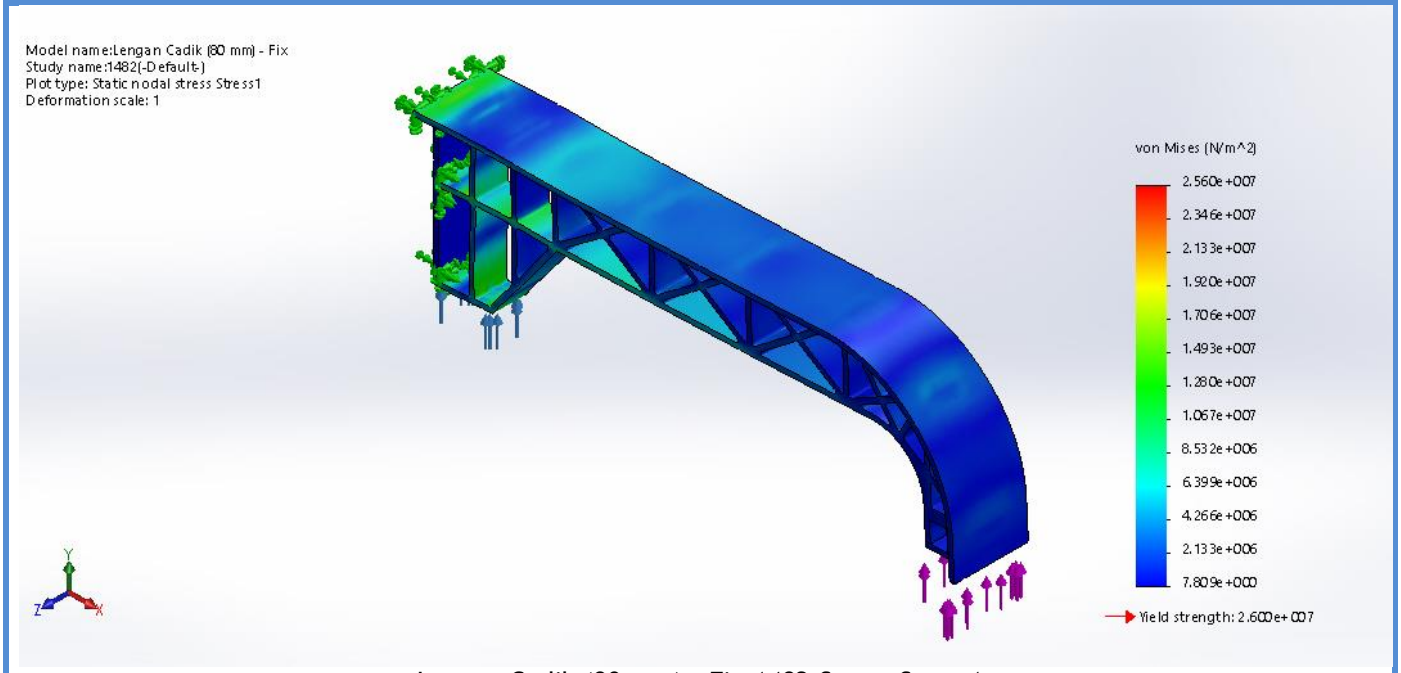
Mesh information - Details

Total Nodes	24037
Total Elements	11768
Maximum Aspect Ratio	17.868
% of elements with Aspect Ratio < 3	72.6
% of elements with Aspect Ratio > 10	0.544
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:03
Computer name:	



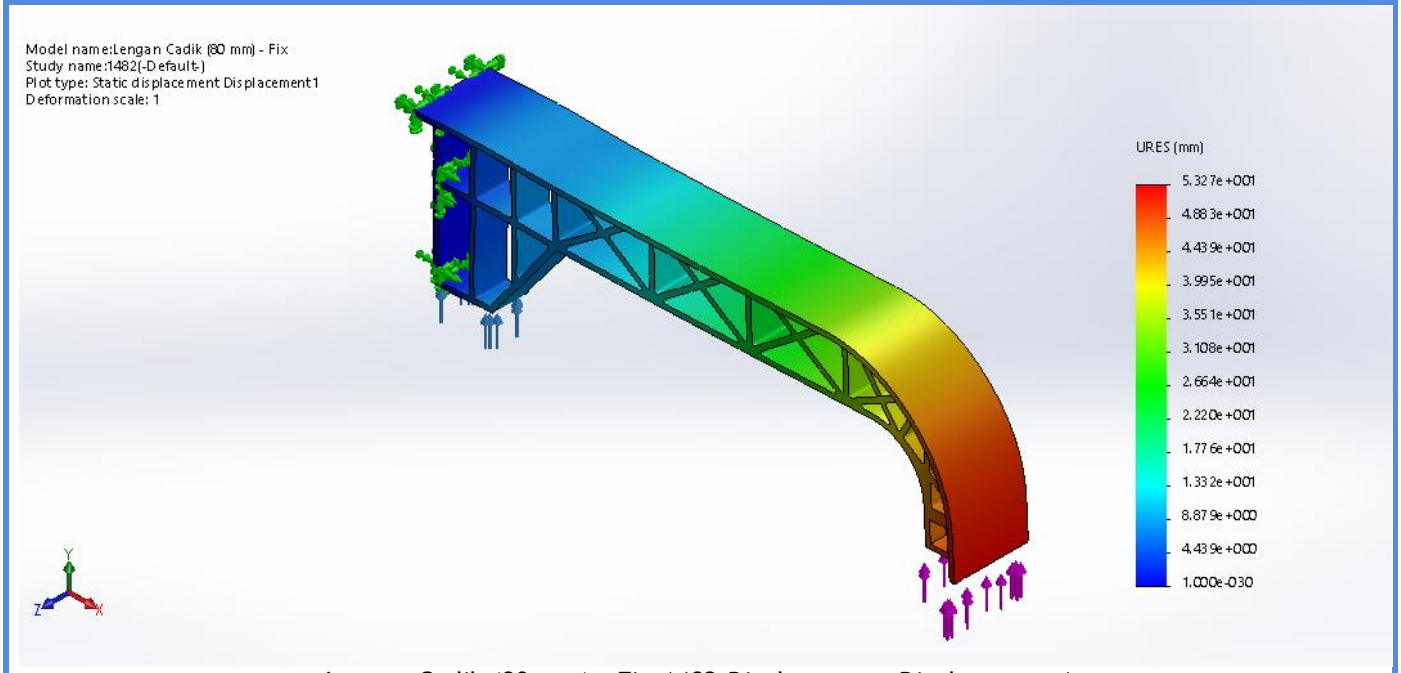
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	7.809e+000N/m^2 Node: 10941	2.560e+007N/m^2 Node: 10873



Lengan Cadik (80 mm) - Fix-1482-Stress-Stress1

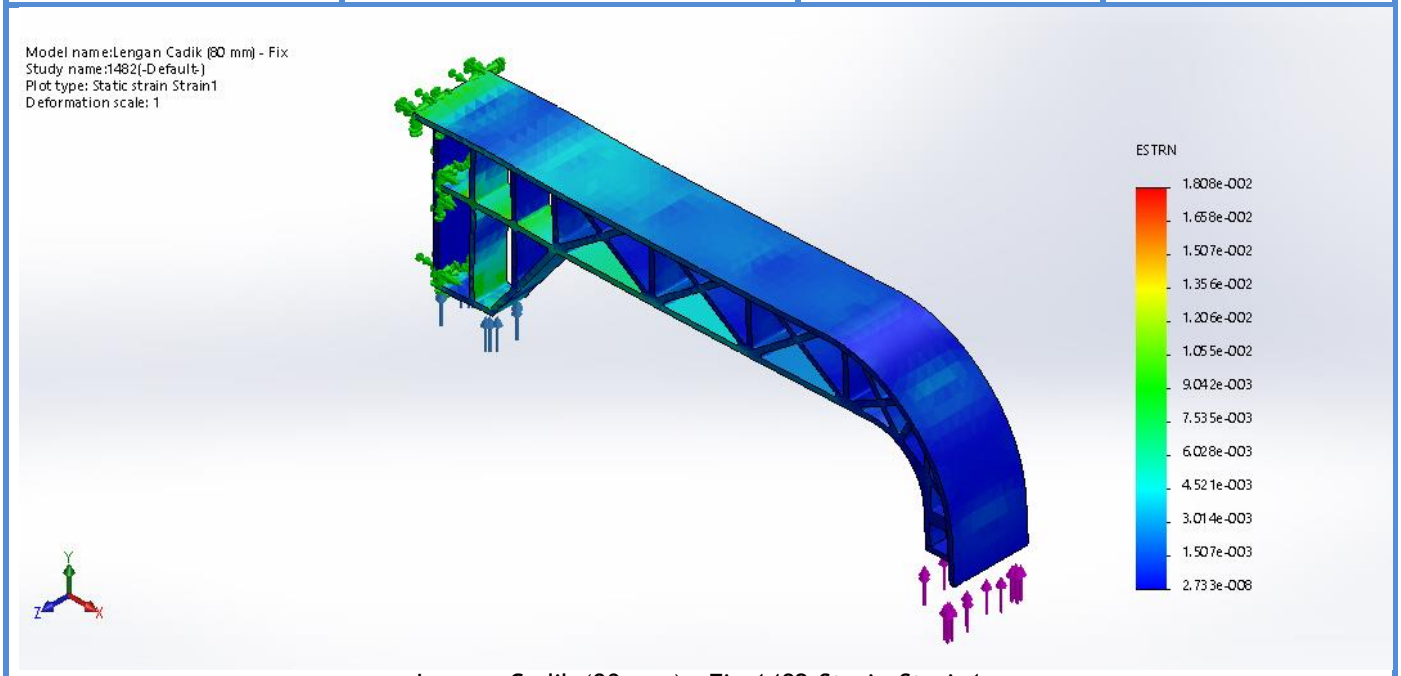
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 449	5.327e+001mm Node: 16875



Lengan Cadik (80 mm) - Fix-1482-Displacement-Displacement1

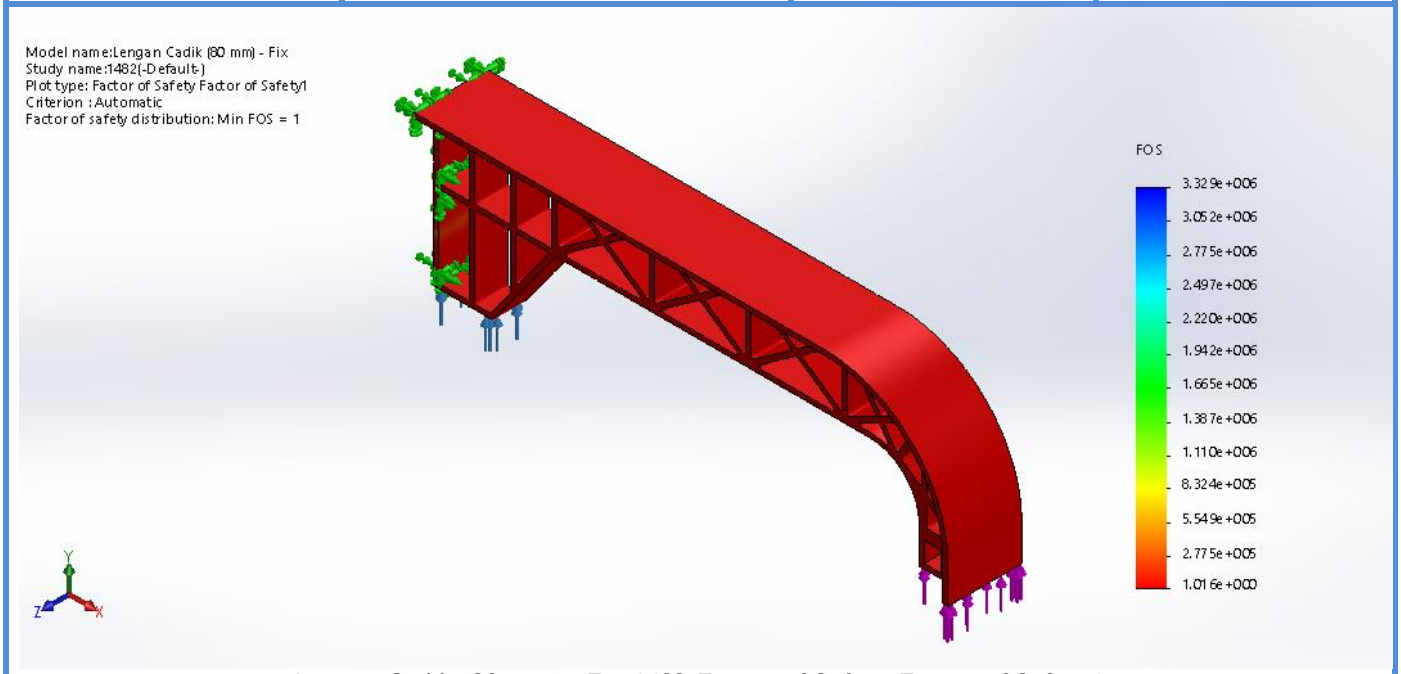
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	2.733e-008 Element: 3328	1.808e-002 Element: 338

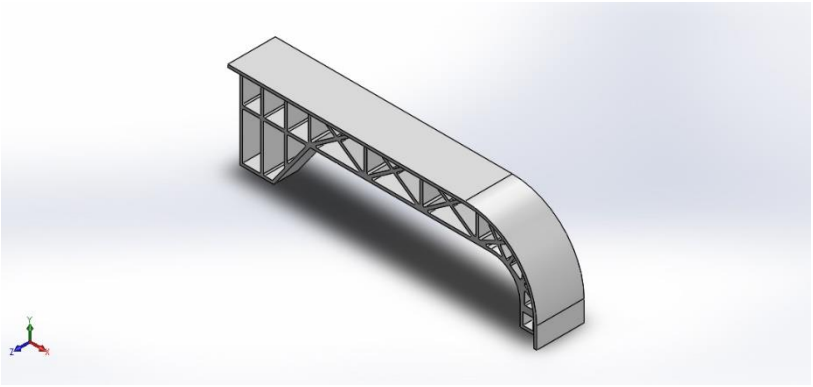


Lengan Cadik (80 mm) - Fix-1482-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.016e+000 Node: 10873	3.329e+006 Node: 10941



Lengan Cadik (80 mm) - Fix-1482-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (100 mm) - Fix

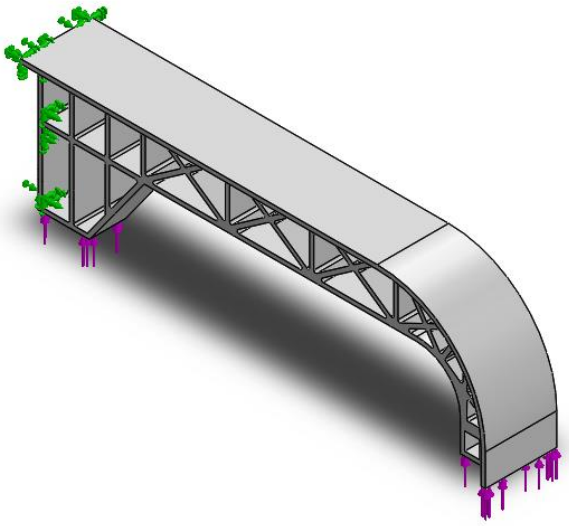
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 133
Analysis type: Static

Table of Contents

Description

No Data

Model Information



Model name: Lengan Cadik (100 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude2 	Solid Body	**Mass:10.7703 kg** **Volume:0.0113133 m^3** **Density:952 kg/m^3** **Weight:105.549 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (100 mm) - Fix.SLDPRT** Jul 09 07:15:18 2018

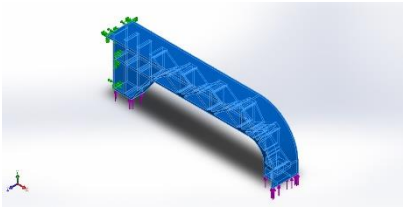
Study Properties

Study name	133
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

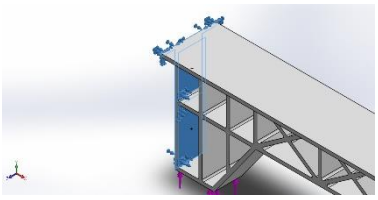
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

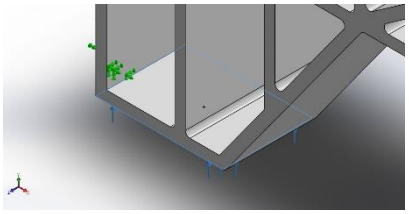
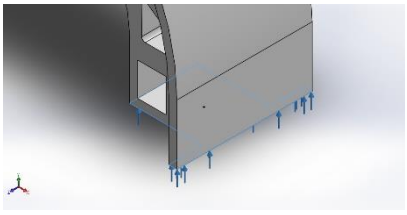
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude2)(Lengan Cadik (100 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-0.749687	-2384.85	-0.53669	2384.85
Reaction Moment(N.m)	0	0	0	0

Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 133.55 N

Connector Definitions

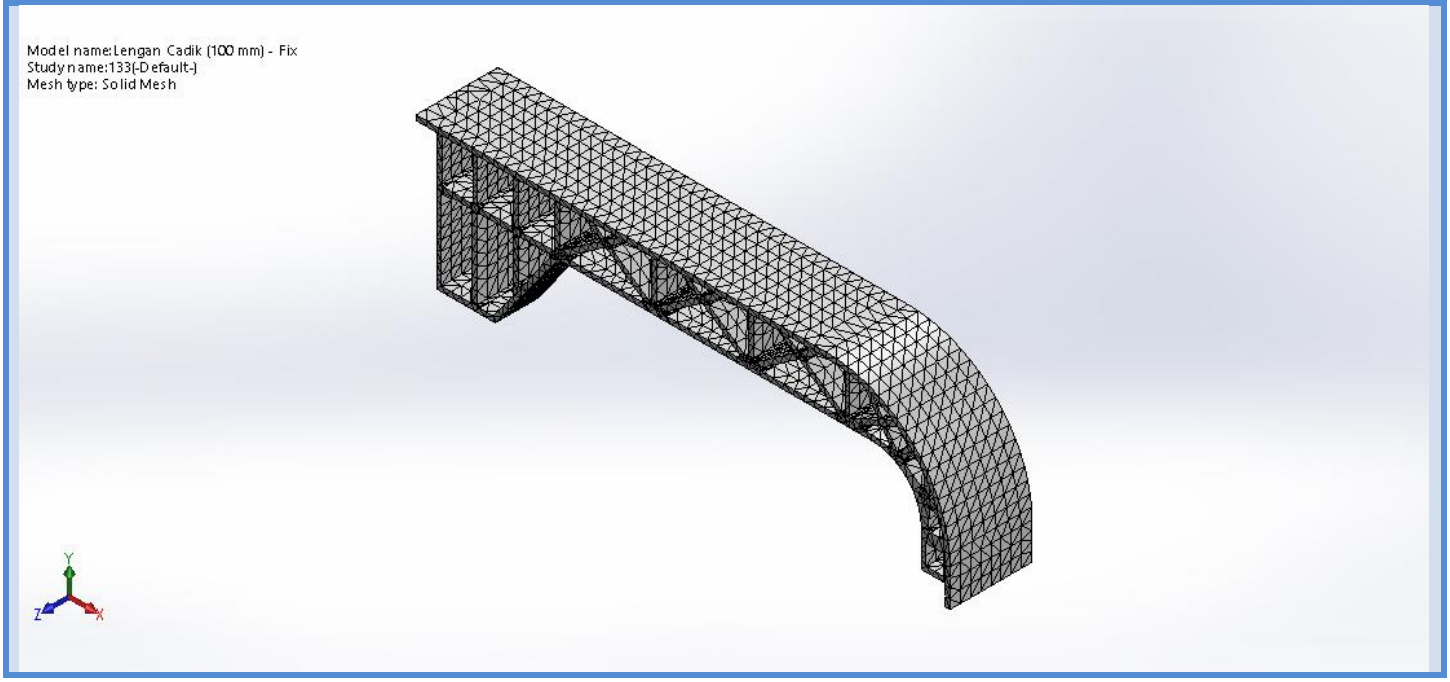
No Data

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	27.1483 mm
Tolerance	1.35742 mm
Mesh Quality Plot	High

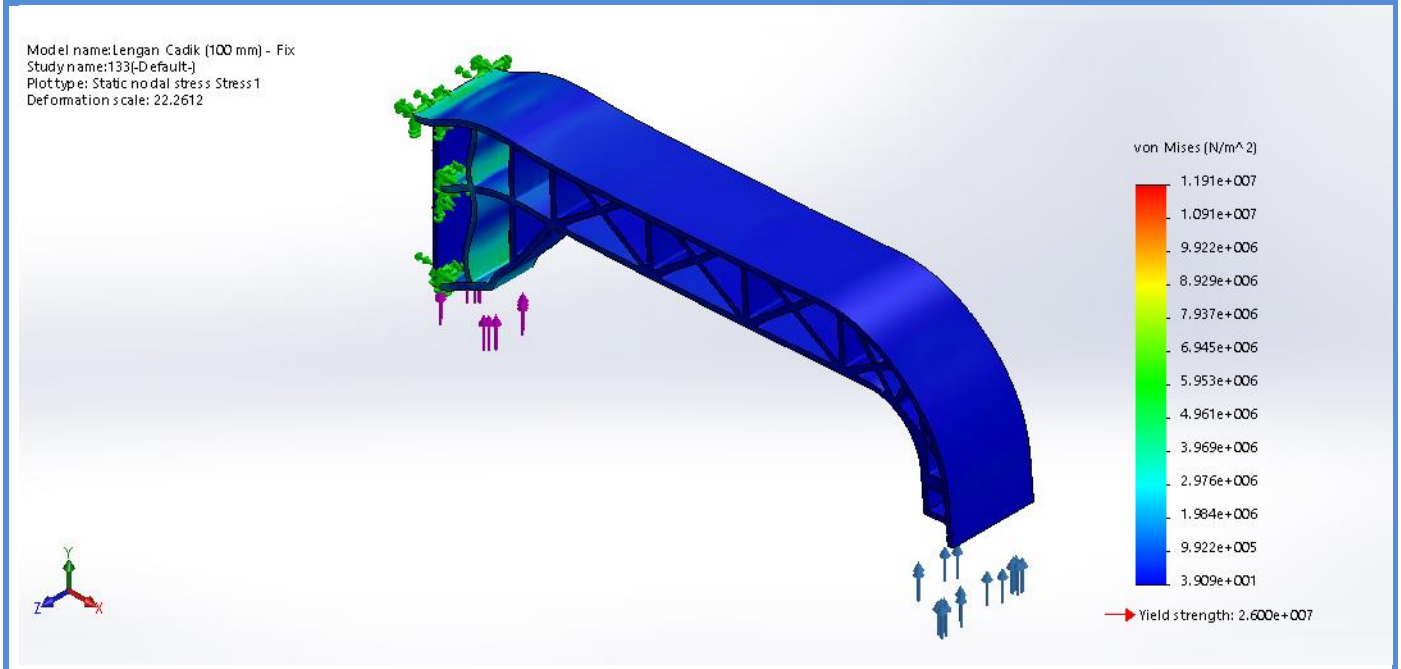
Mesh information - Details

Total Nodes	24625
Total Elements	12208
Maximum Aspect Ratio	28.534
% of elements with Aspect Ratio < 3	66.1
% of elements with Aspect Ratio > 10	0.68
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



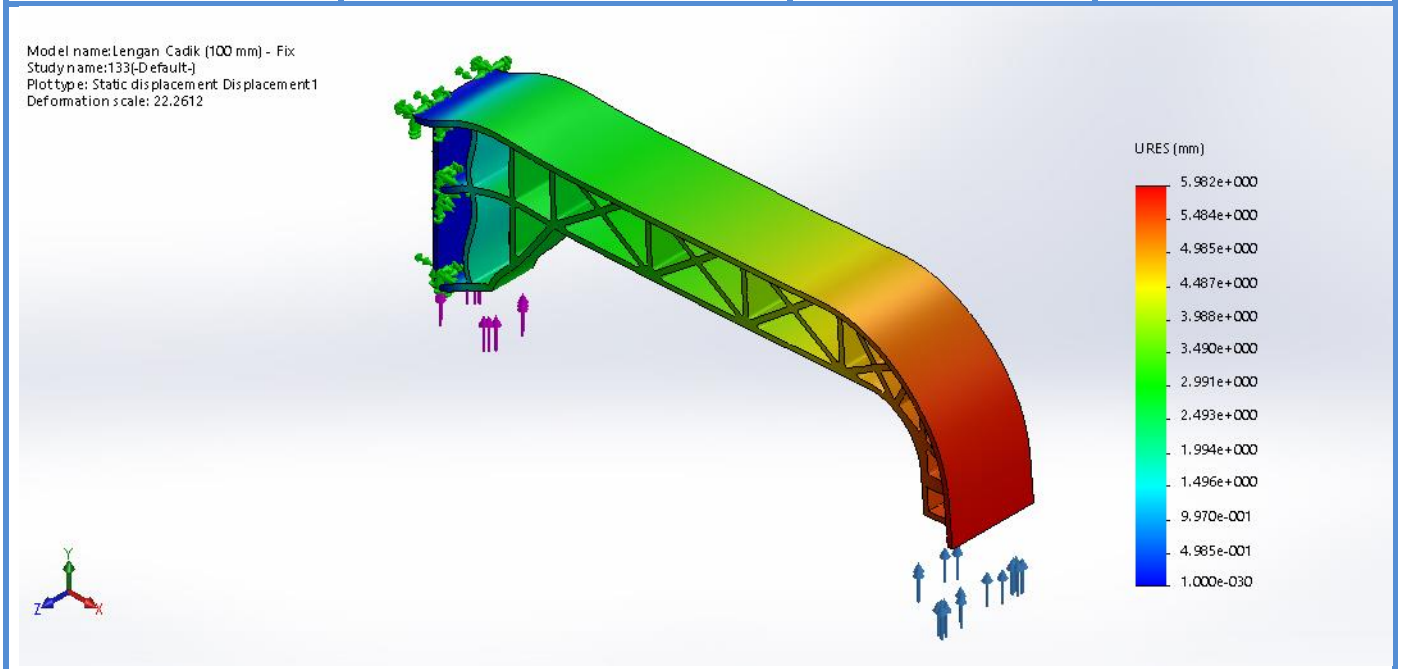
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	3.909e+001N/m^2 Node: 11353	1.191e+007N/m^2 Node: 3690



Lengan Cadik (100 mm) - Fix-133-Stress-Stress1

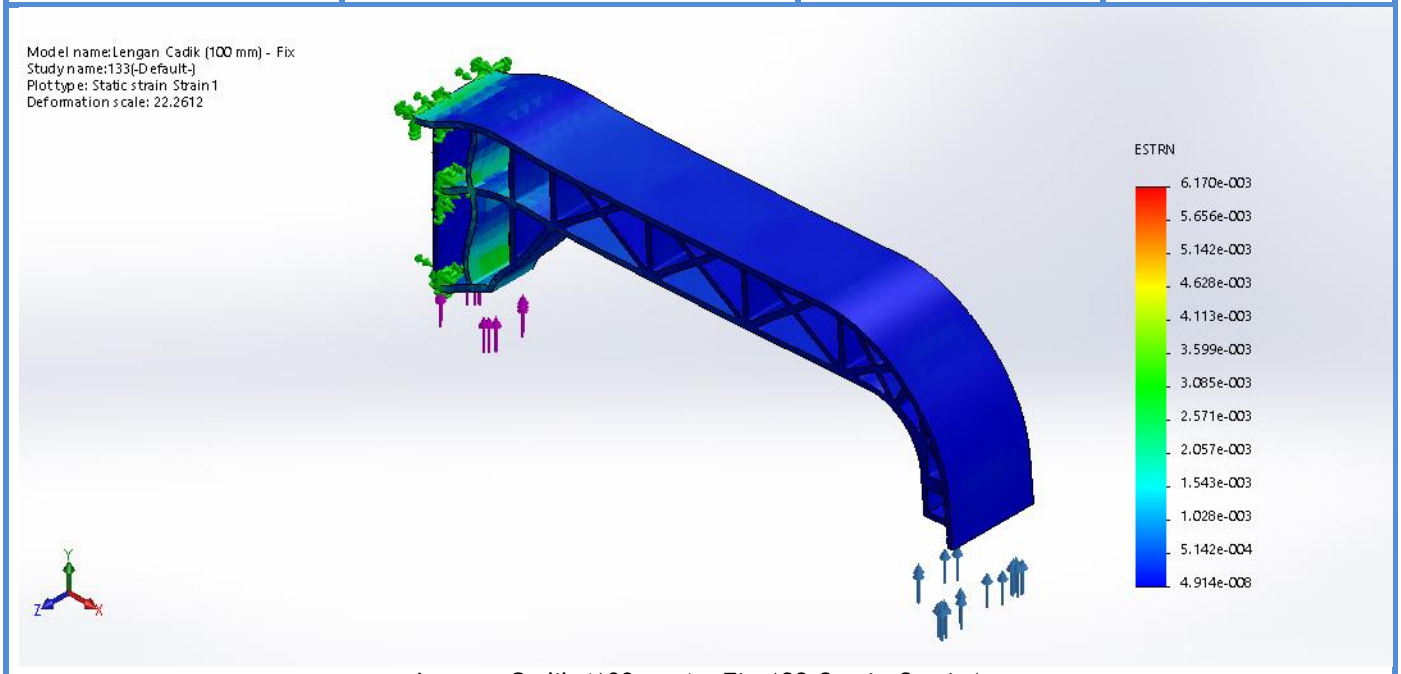
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 446	5.982e+000mm Node: 17629



Lengan Cadik (100 mm) - Fix-133-Displacement-Displacement1

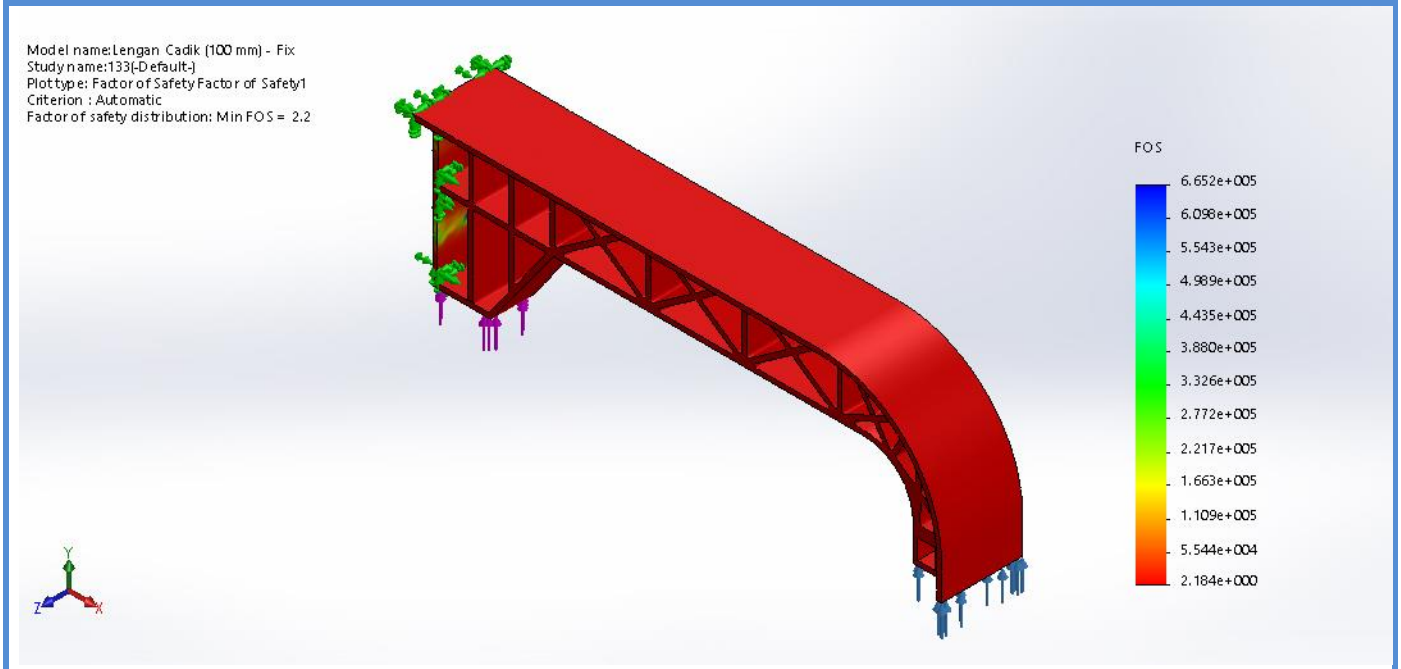
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	4.914e-008 Element: 10641	6.170e-003 Element: 6022

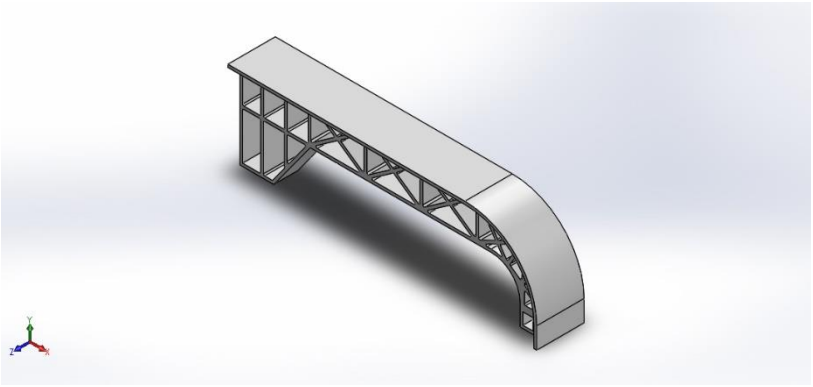


Lengan Cadik (100 mm) - Fix-133-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	2.184e+000 Node: 3690	6.652e+005 Node: 11353



Lengan Cadik (100 mm) - Fix-133-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (100 mm) - Fix

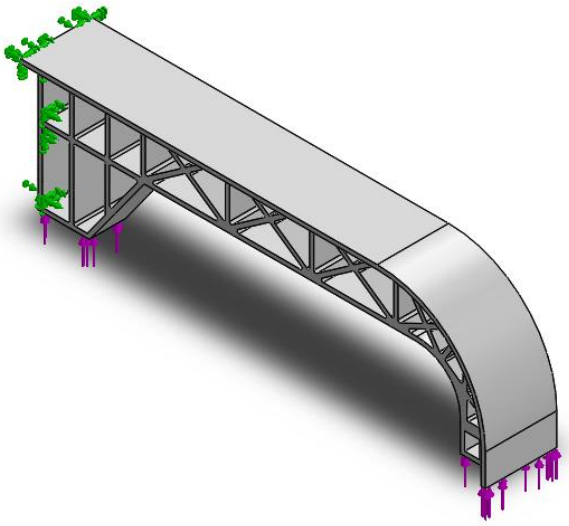
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 361
Analysis type: Static

Table of Contents

Description

No Data

Model Information



Model name: Lengan Cadik (100 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude2 	Solid Body	**Mass:10.7703 kg** **Volume:0.0113133 m^3** **Density:952 kg/m^3** **Weight:105.549 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (100 mm) - Fix.SLDPRT** Jul 09 07:15:18 2018

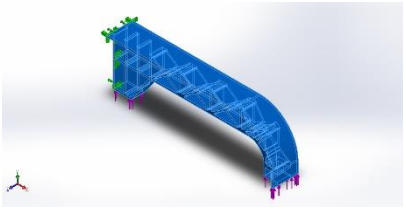
Study Properties

Study name	361
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

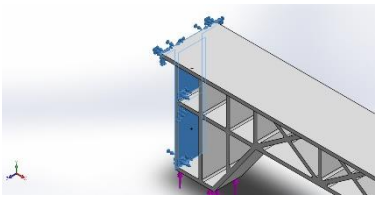
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

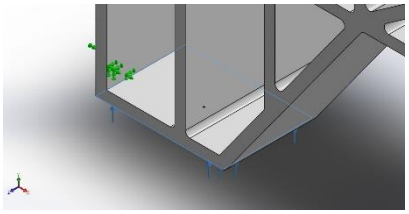
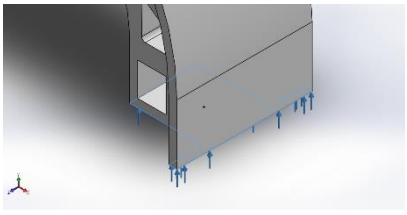
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude2)(Lengan Cadik (100 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	1.51848	-2612.14	1.1055	2612.14
Reaction Moment(N.m)	0	0	0	0

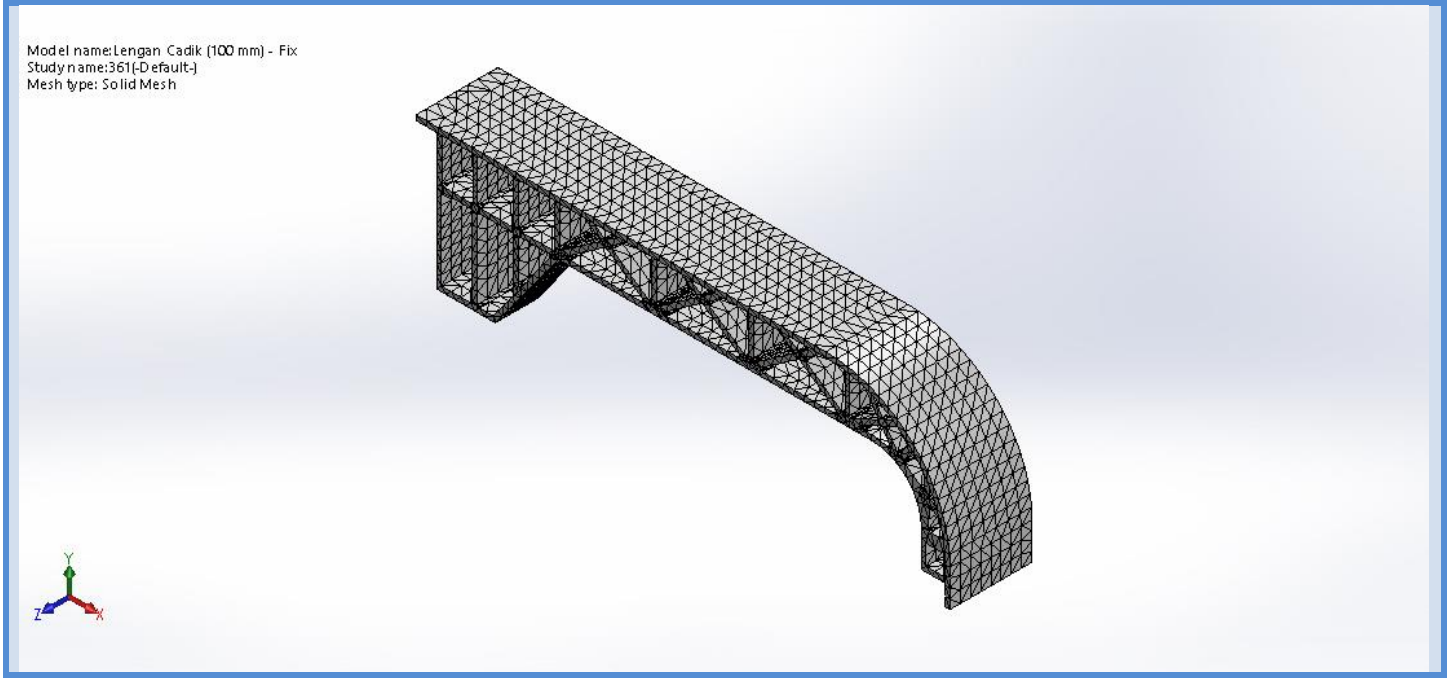
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 361.76 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	27.1483 mm
Tolerance	1.35742 mm
Mesh Quality Plot	High

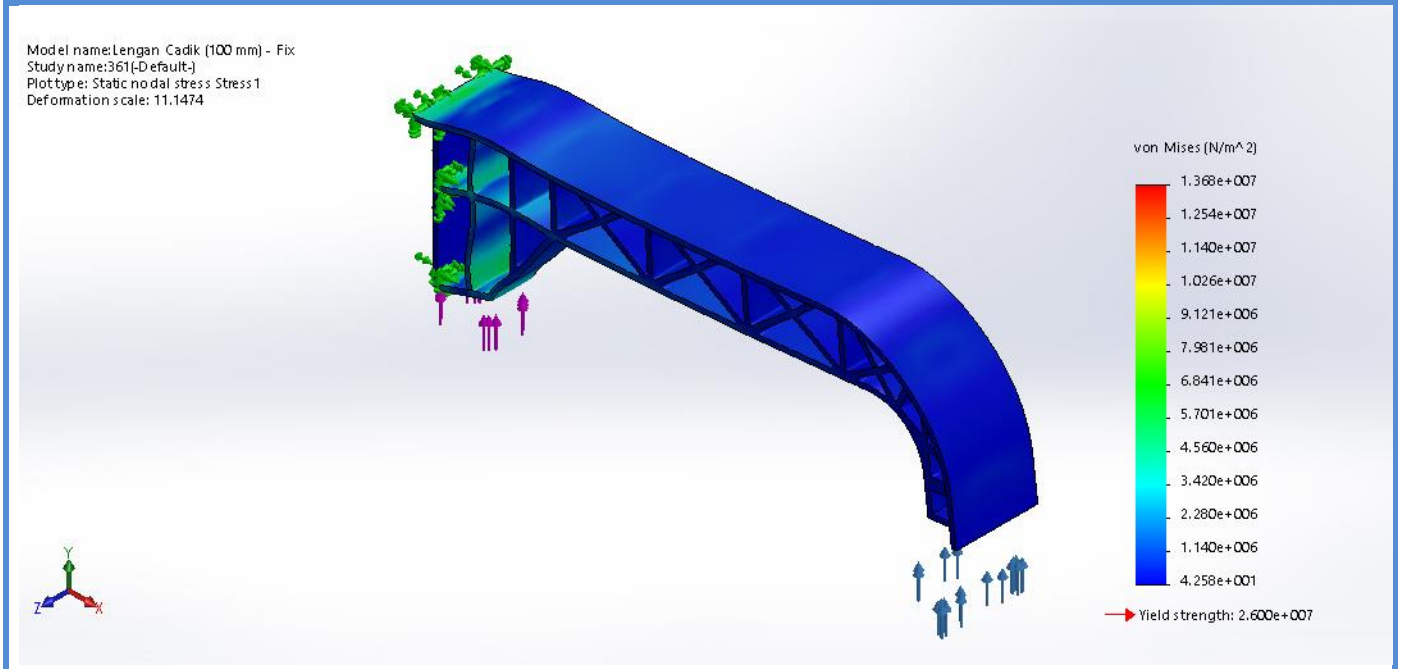
Mesh information - Details

Total Nodes	24625
Total Elements	12208
Maximum Aspect Ratio	28.534
% of elements with Aspect Ratio < 3	66.1
% of elements with Aspect Ratio > 10	0.68
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:03
Computer name:	



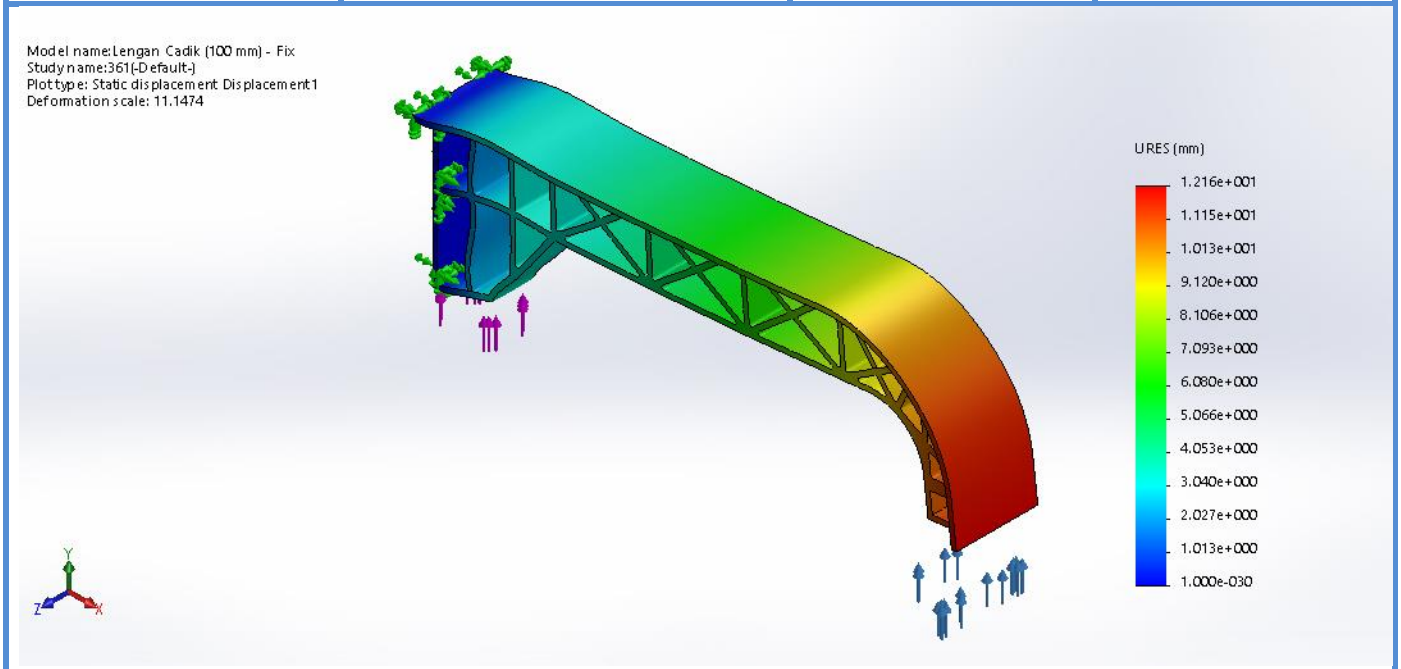
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	4.258e+001N/m^2 Node: 11464	1.368e+007N/m^2 Node: 3690



Lengan Cadik (100 mm) - Fix-361-Stress-Stress1

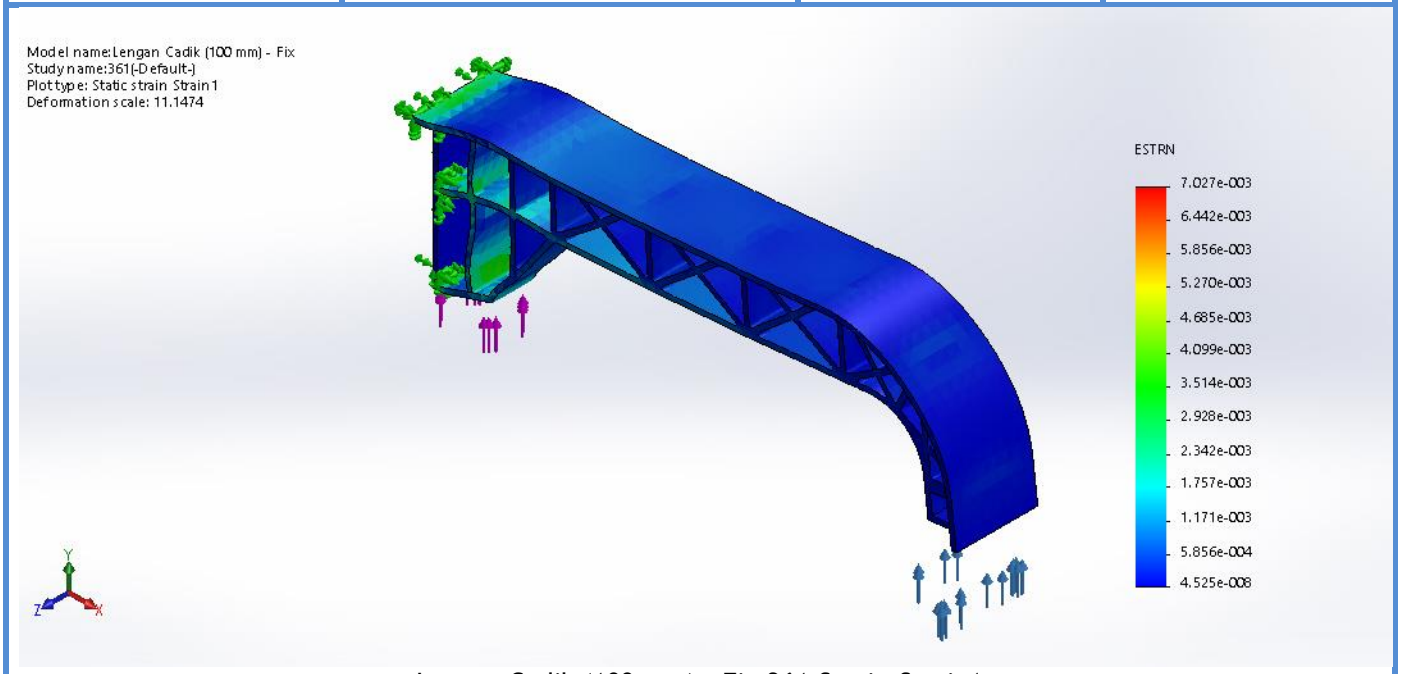
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 446	1.216e+001mm Node: 17626



Lengan Cadik (100 mm) - Fix-361-Displacement-Displacement1

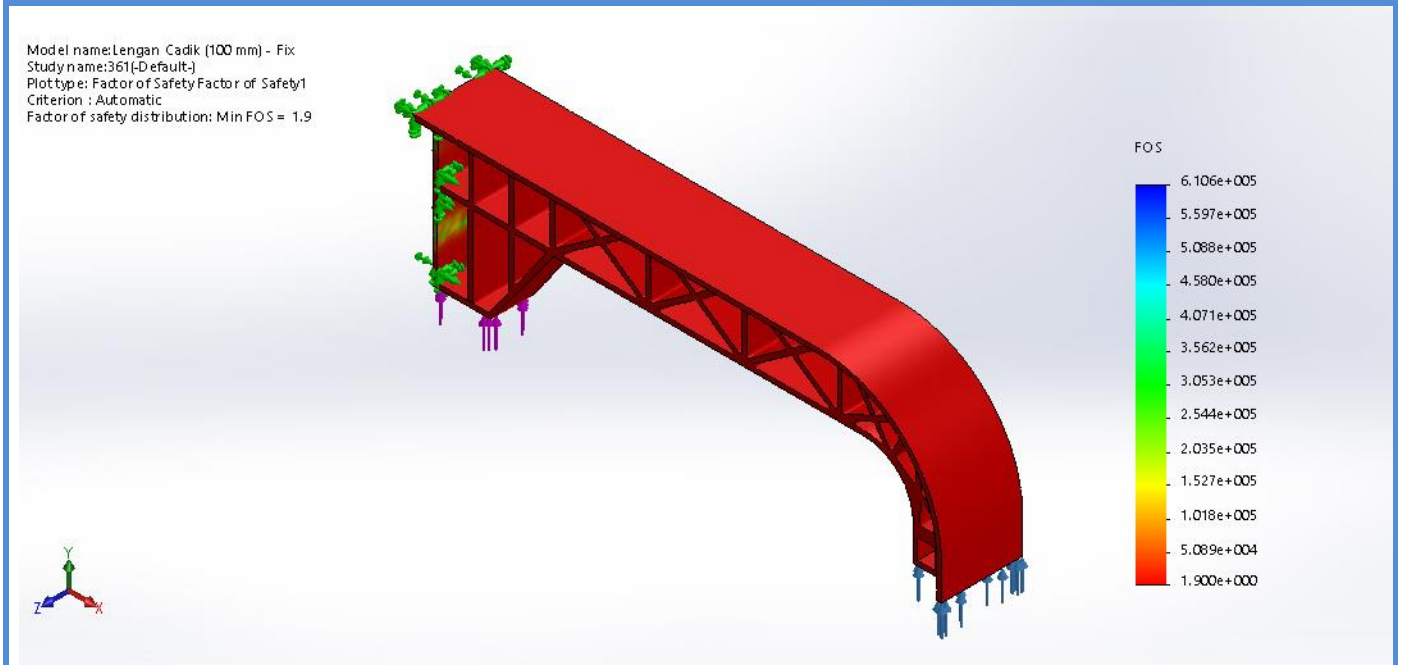
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	4.525e-008 Element: 9022	7.027e-003 Element: 6022

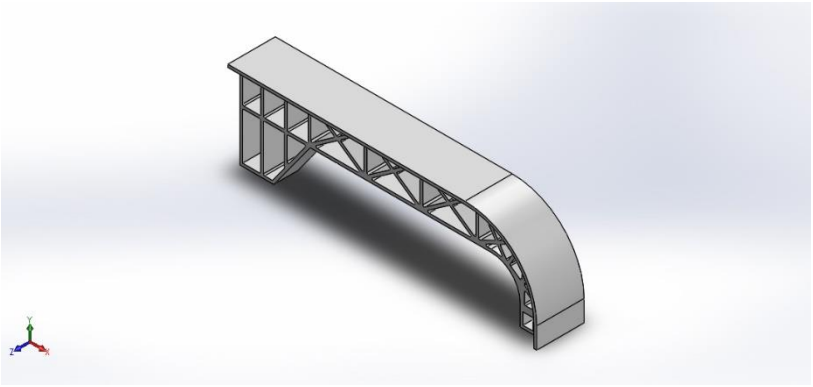


Lengan Cadik (100 mm) - Fix-361-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.900e+000 Node: 3690	6.106e+005 Node: 11464



Lengan Cadik (100 mm) - Fix-361-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (100 mm) - Fix

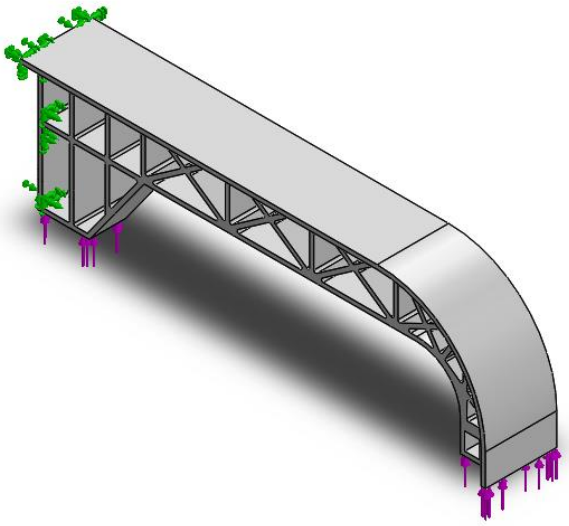
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 633
Analysis type: Static

Table of Contents

Description

No Data

Model Information



Model name: Lengan Cadik (100 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude2 	Solid Body	**Mass:10.7703 kg** **Volume:0.0113133 m^3** **Density:952 kg/m^3** **Weight:105.549 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (100 mm) - Fix.SLDPRT** Jul 09 07:15:18 2018

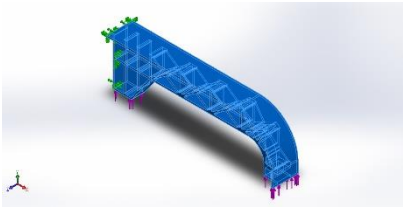
Study Properties

Study name	633
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

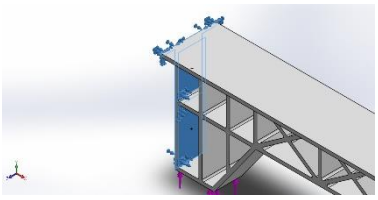
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

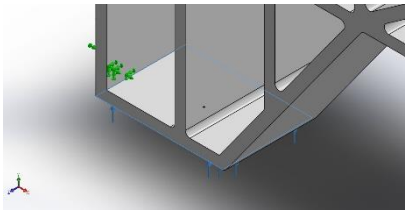
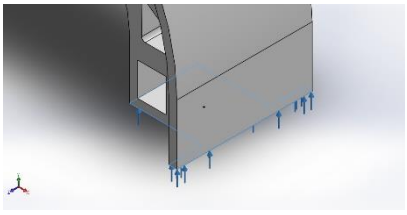
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude2)(Lengan Cadik (100 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-0.951042	-2883.99	-0.607788	2883.99
Reaction Moment(N.m)	0	0	0	0

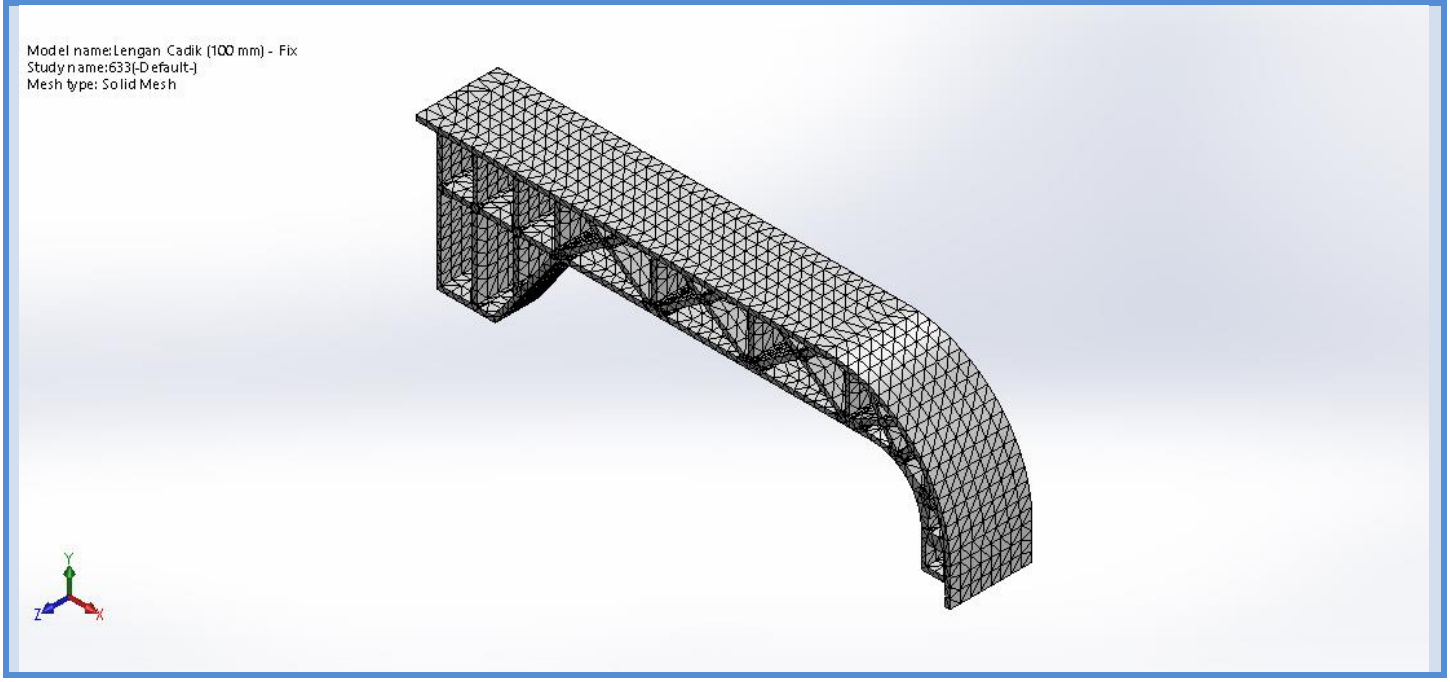
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 633.36 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	27.1483 mm
Tolerance	1.35742 mm
Mesh Quality Plot	High

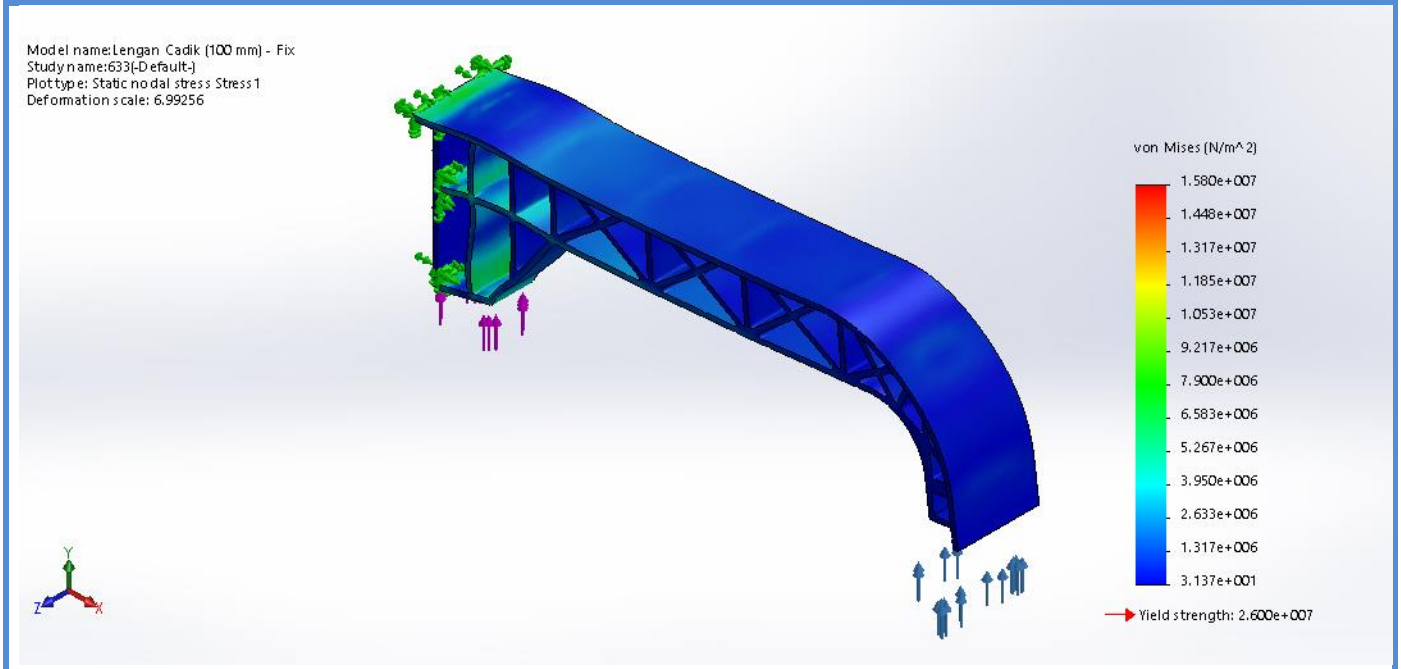
Mesh information - Details

Total Nodes	24625
Total Elements	12208
Maximum Aspect Ratio	28.534
% of elements with Aspect Ratio < 3	66.1
% of elements with Aspect Ratio > 10	0.68
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



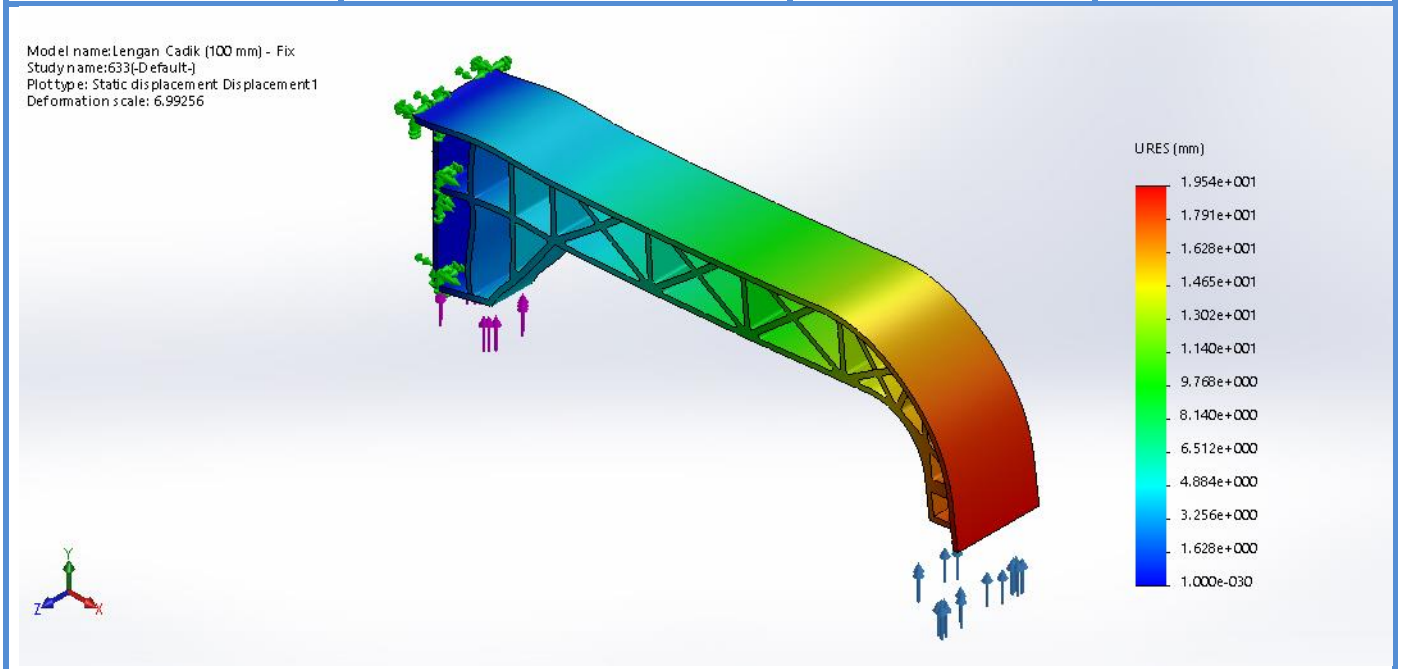
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	3.137e+001N/m^2 Node: 9850	1.580e+007N/m^2 Node: 3690



Lengan Cadik (100 mm) - Fix-633-Stress-Stress1

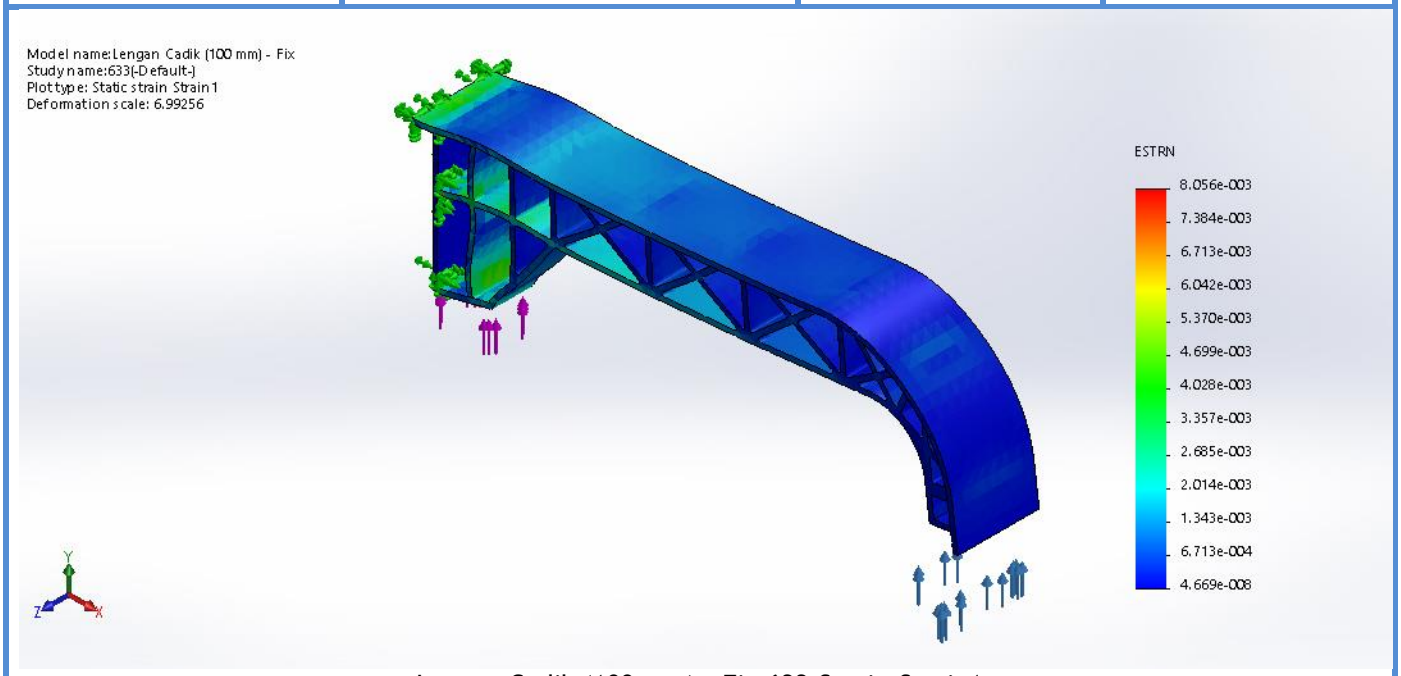
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 446	1.954e+001mm Node: 17621



Lengan Cadik (100 mm) - Fix-633-Displacement-Displacement1

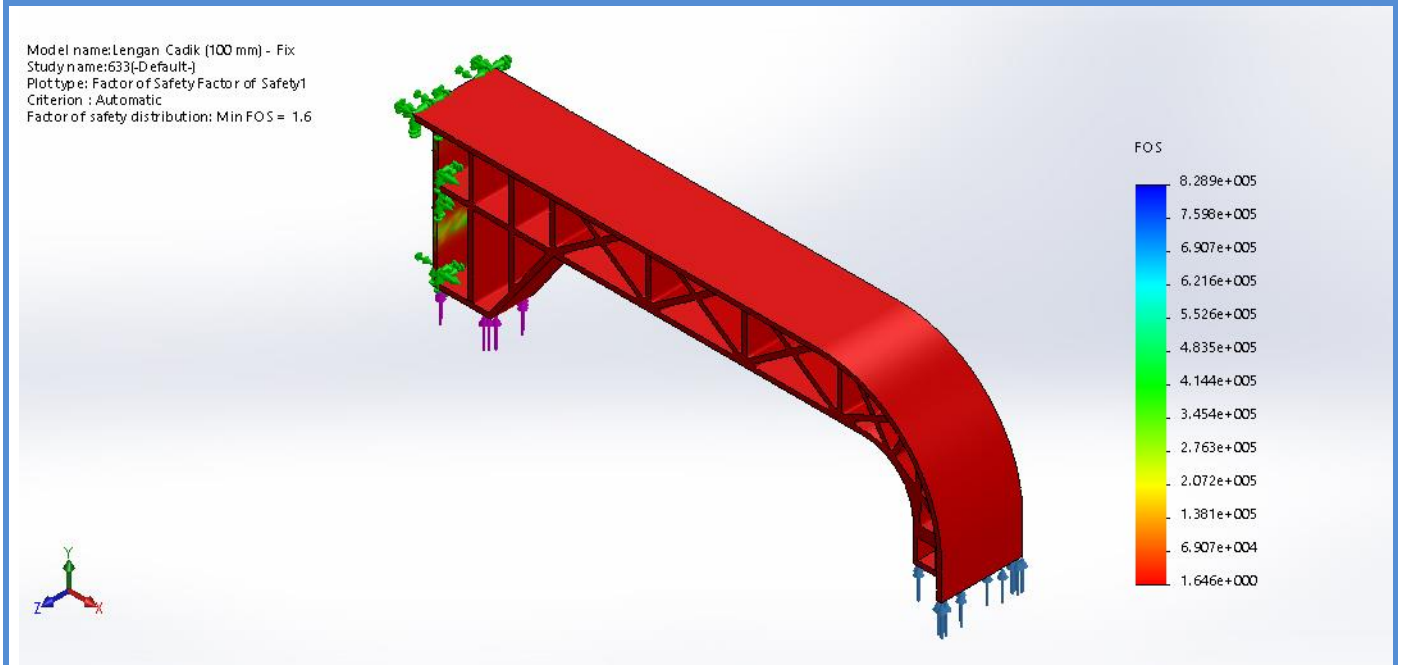
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	4.669e-008 Element: 3942	8.056e-003 Element: 6022

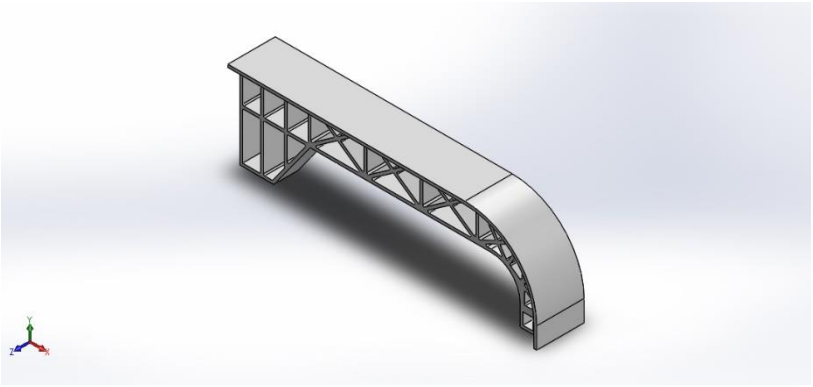


Lengan Cadik (100 mm) - Fix-633-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.646e+000 Node: 3690	8.289e+005 Node: 9850



Lengan Cadik (100 mm) - Fix-633-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (100 mm) - Fix

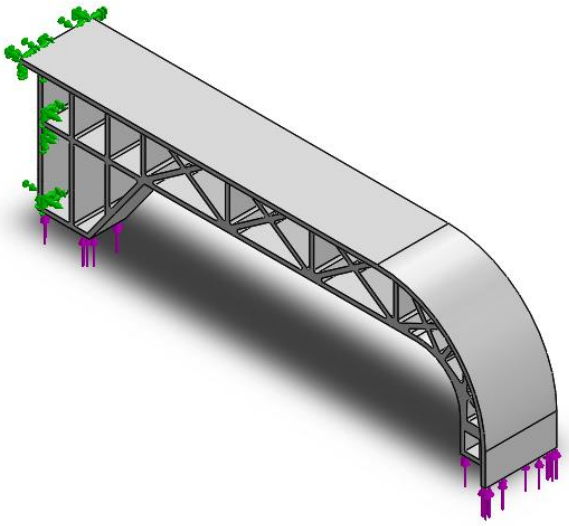
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 916
Analysis type: Static

Table of Contents

Description

No Data

Model Information



Model name: Lengan Cadik (100 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude2 	Solid Body	**Mass:10.7703 kg** **Volume:0.0113133 m^3** **Density:952 kg/m^3** **Weight:105.549 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (100 mm) - Fix.SLDPRT** Jul 09 07:15:18 2018

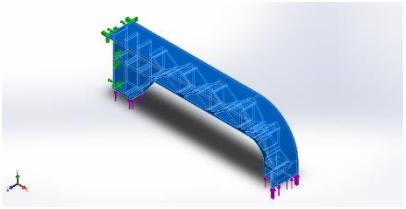
Study Properties

Study name	916
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

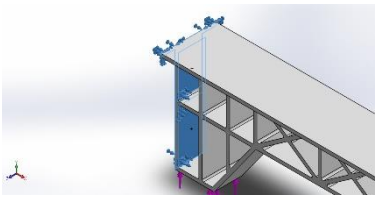
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

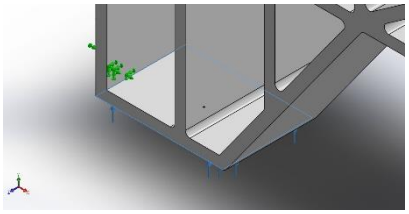
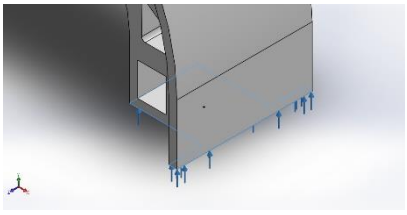
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude2)(Lengan Cadik (100 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-1.38162	-3167.65	0.0598984	3167.65
Reaction Moment(N.m)	0	0	0	0

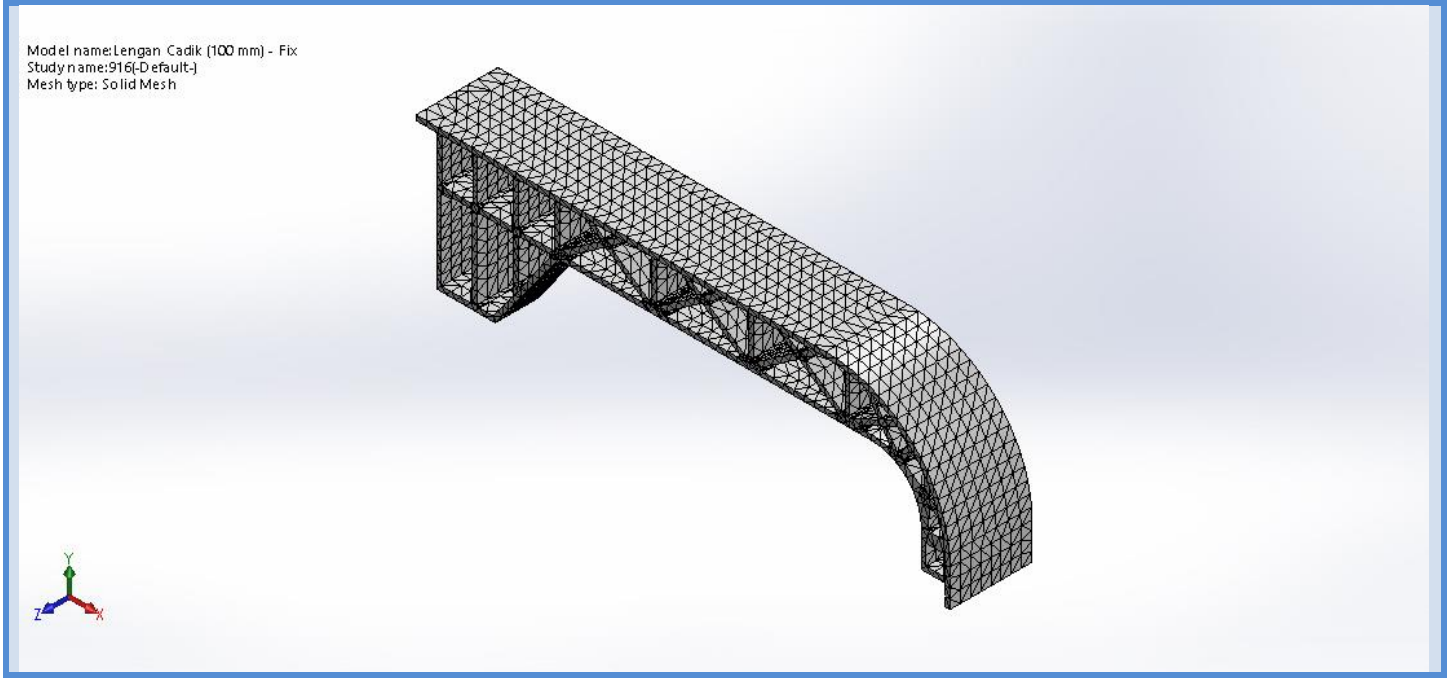
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 916.04 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	27.1483 mm
Tolerance	1.35742 mm
Mesh Quality Plot	High

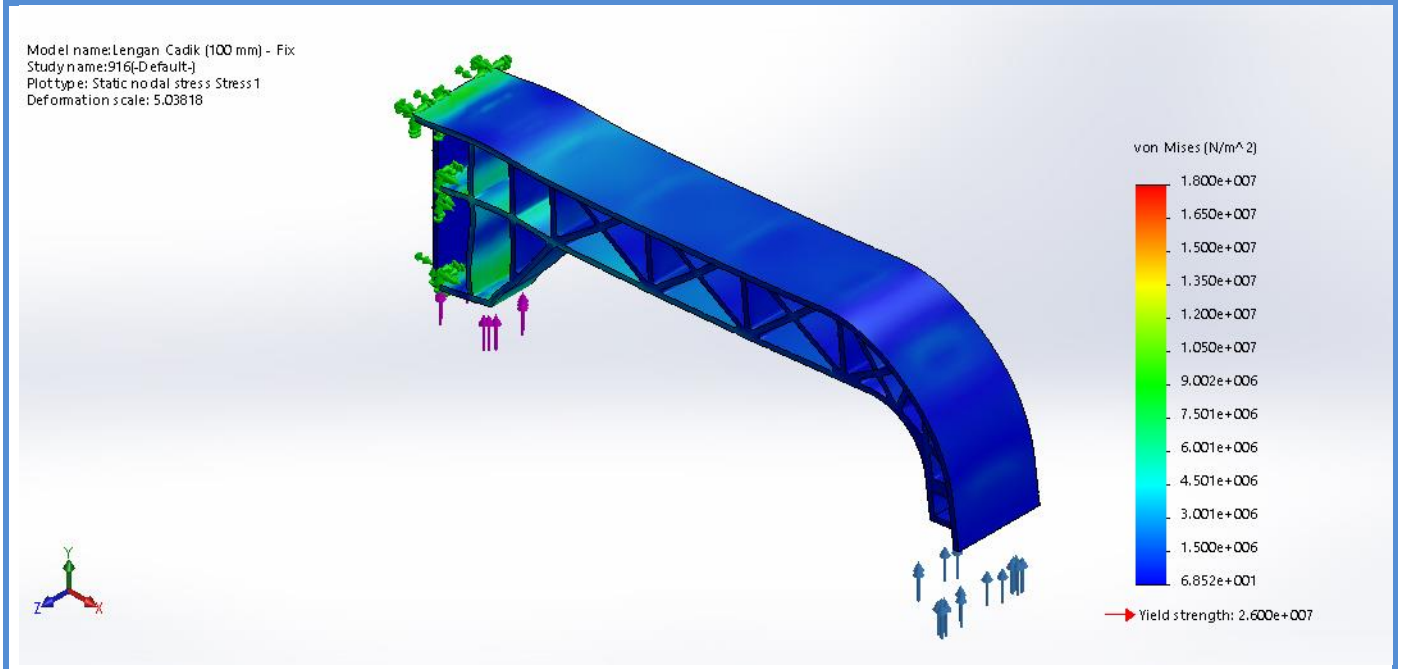
Mesh information - Details

Total Nodes	24625
Total Elements	12208
Maximum Aspect Ratio	28.534
% of elements with Aspect Ratio < 3	66.1
% of elements with Aspect Ratio > 10	0.68
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:03
Computer name:	



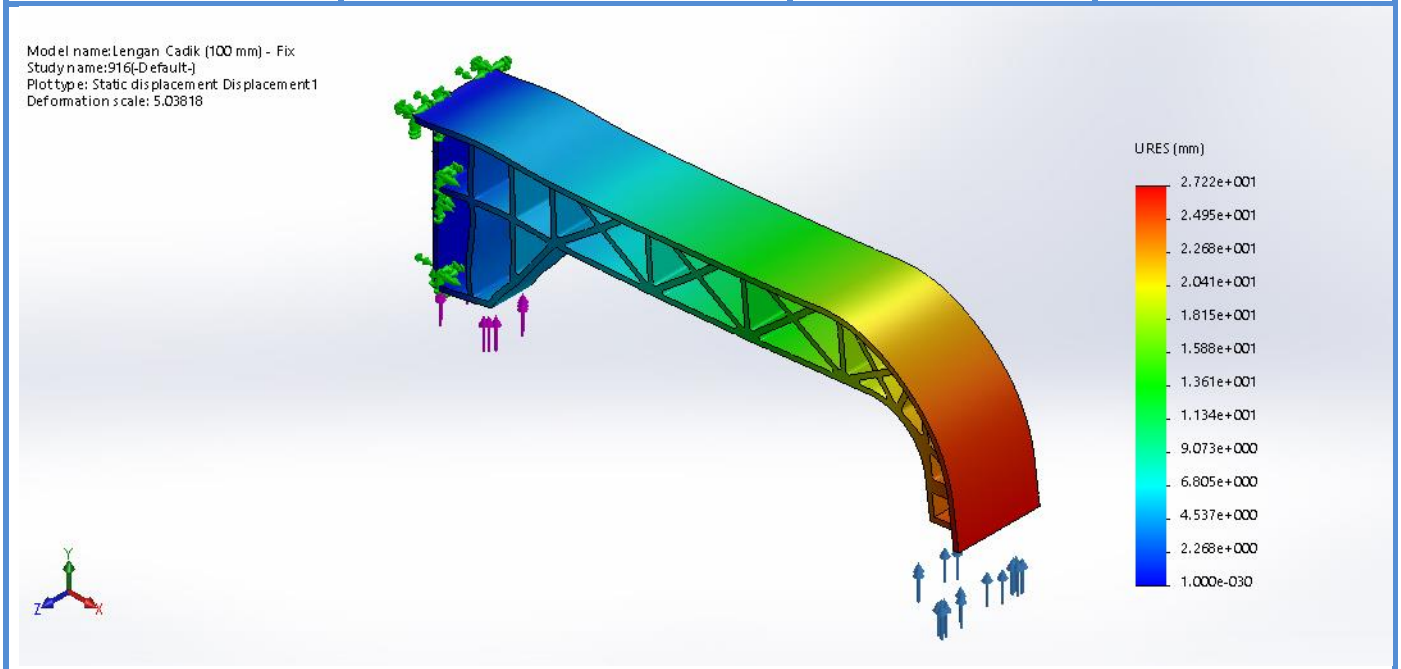
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	6.852e+001N/m^2 Node: 2277	1.800e+007N/m^2 Node: 3690



Lengan Cadik (100 mm) - Fix-916-Stress-Stress1

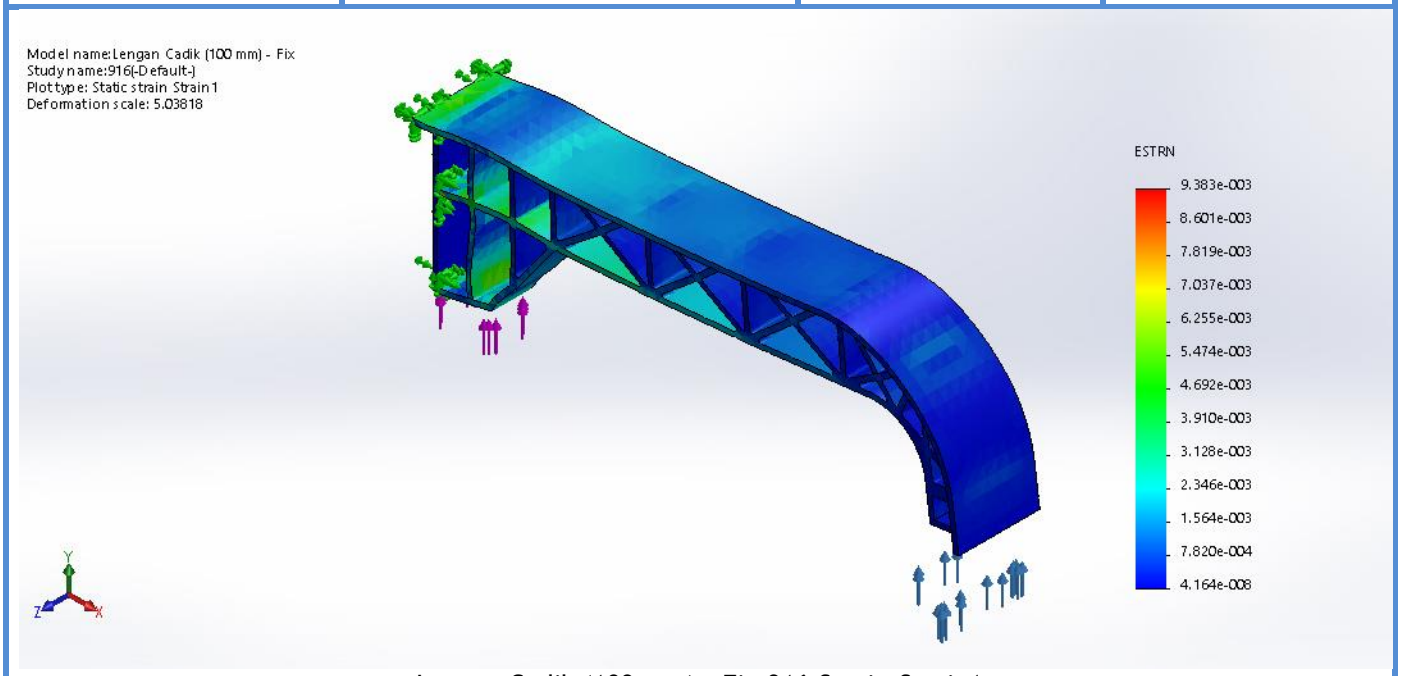
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 446	2.722e+001mm Node: 17621



Lengan Cadik (100 mm) - Fix-916-Displacement-Displacement1

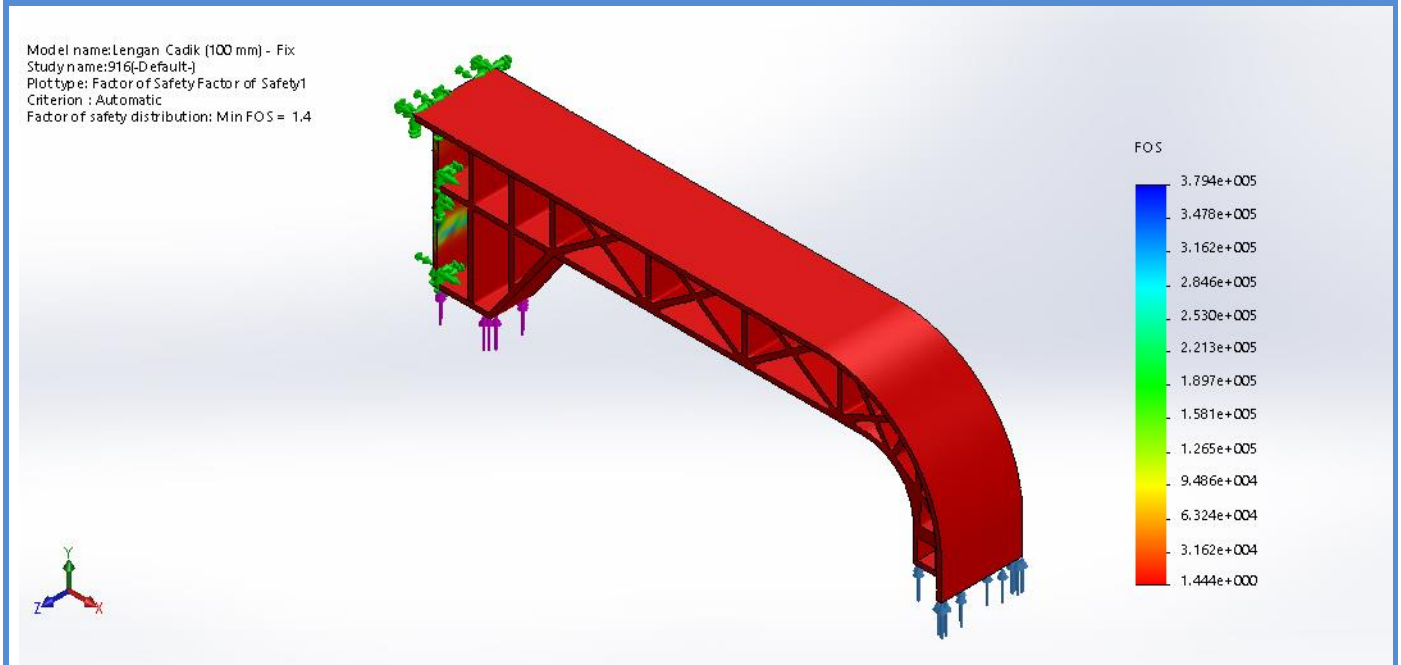
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	4.164e-008 Element: 3235	9.383e-003 Element: 1459

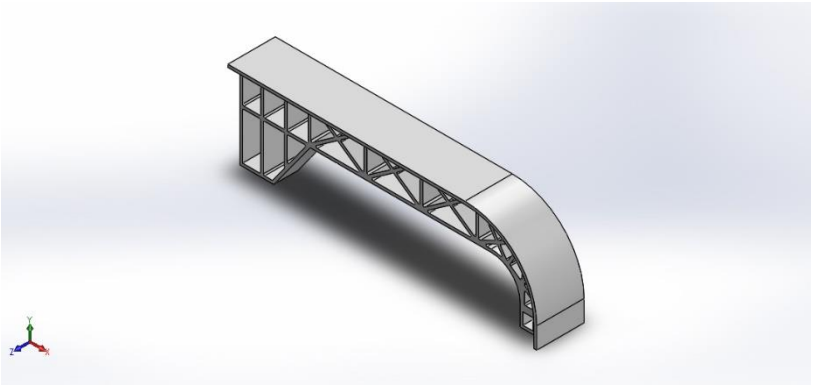


Lengan Cadik (100 mm) - Fix-916-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.444e+000 Node: 3690	3.794e+005 Node: 2277



Lengan Cadik (100 mm) - Fix-916-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (100 mm) - Fix

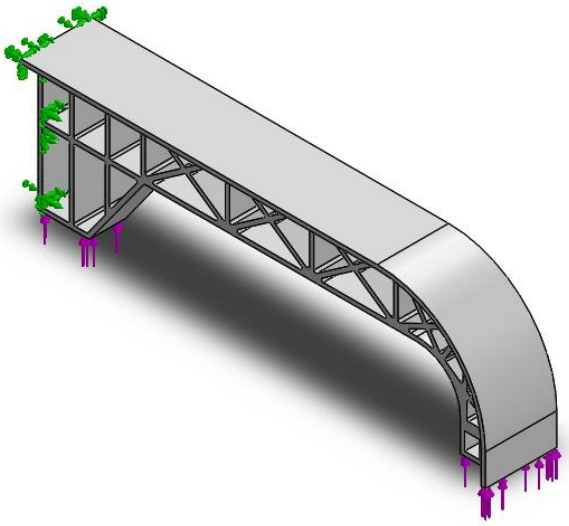
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 1213
Analysis type: Static

Table of Contents

Description

No Data

Model Information



Model name: Lengan Cadik (100 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude2 	Solid Body	**Mass:10.7703 kg** **Volume:0.0113133 m^3** **Density:952 kg/m^3** **Weight:105.549 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (100 mm) - Fix.SLDPRT** Jul 09 07:15:18 2018

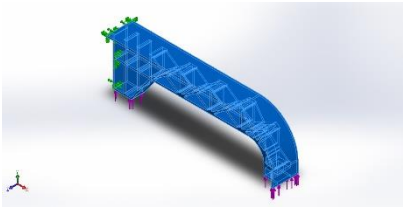
Study Properties

Study name	1213
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

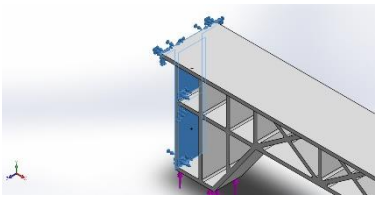
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

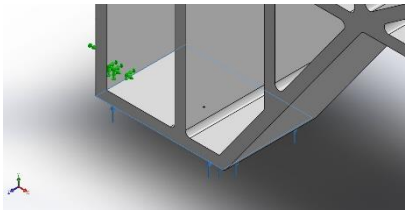
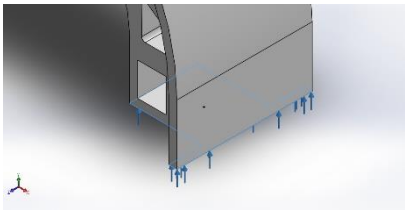
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude2)(Lengan Cadik (100 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-2.22853	-3463.71	0.221405	3463.71
Reaction Moment(N.m)	0	0	0	0

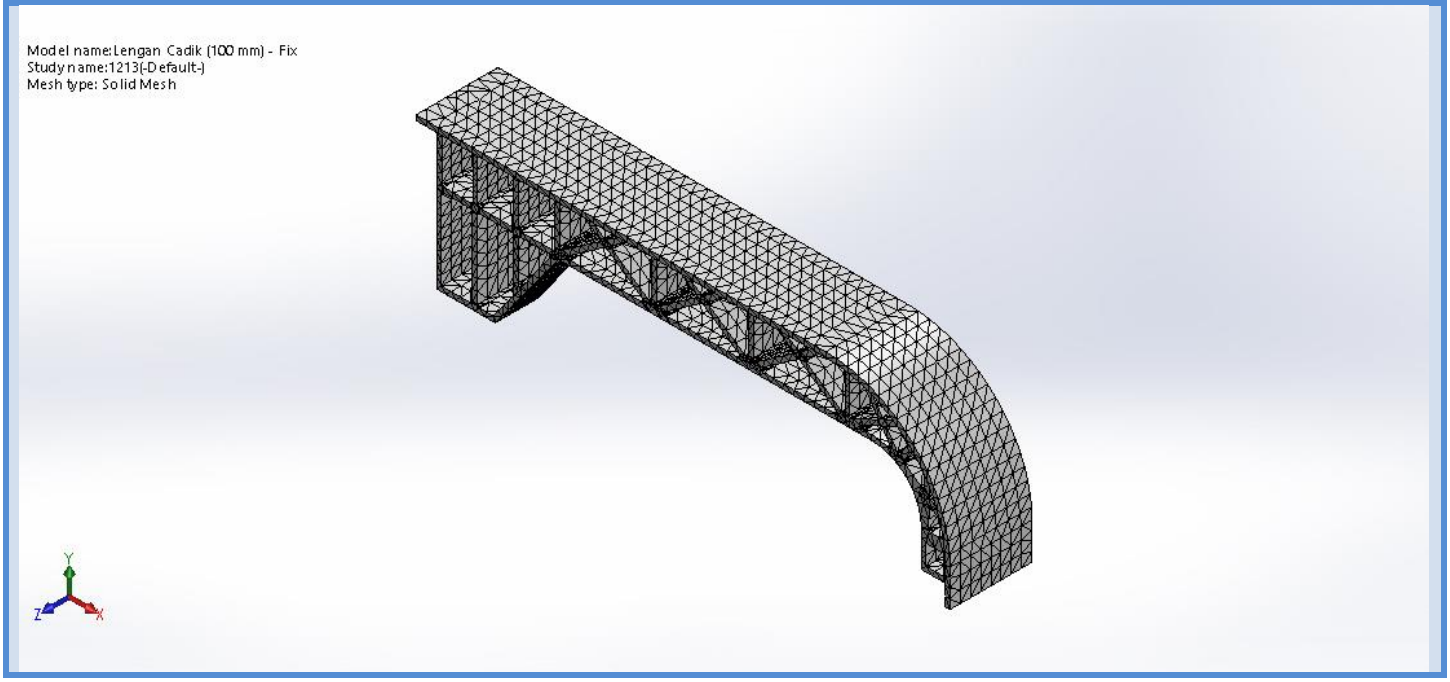
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 1213.18 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	27.1483 mm
Tolerance	1.35742 mm
Mesh Quality Plot	High

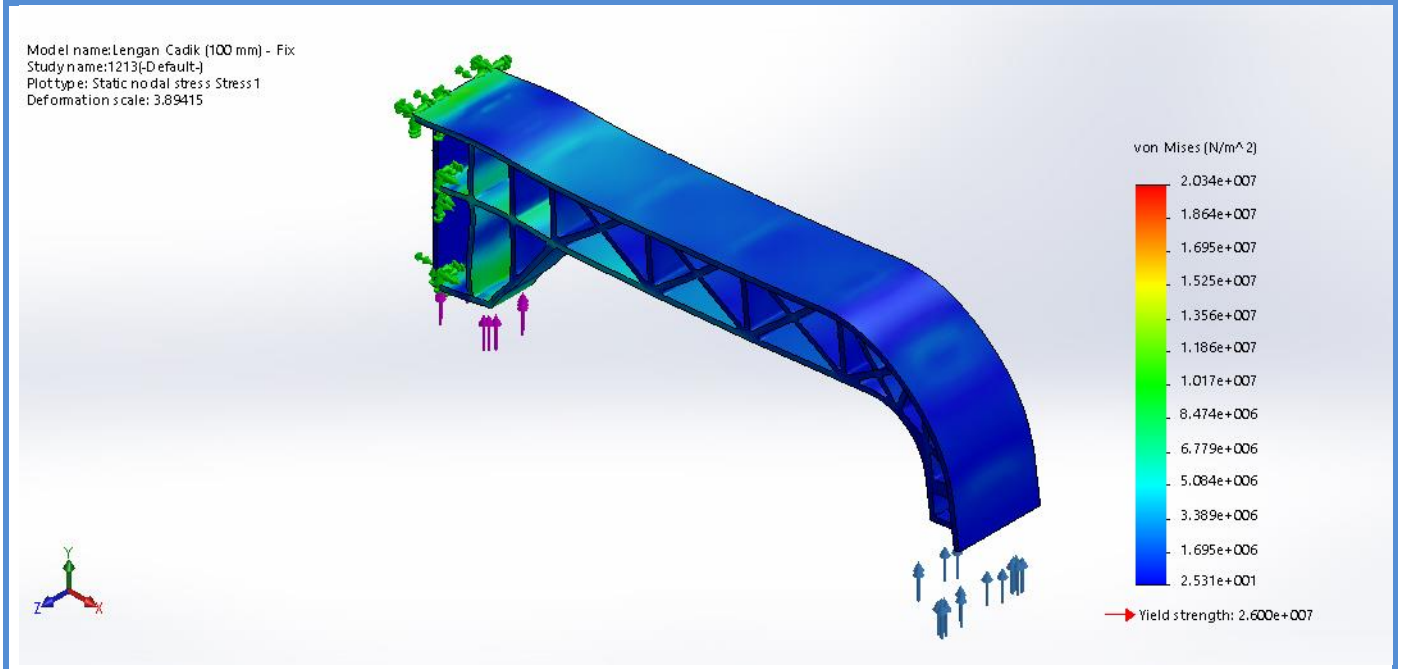
Mesh information - Details

Total Nodes	24625
Total Elements	12208
Maximum Aspect Ratio	28.534
% of elements with Aspect Ratio < 3	66.1
% of elements with Aspect Ratio > 10	0.68
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:03
Computer name:	



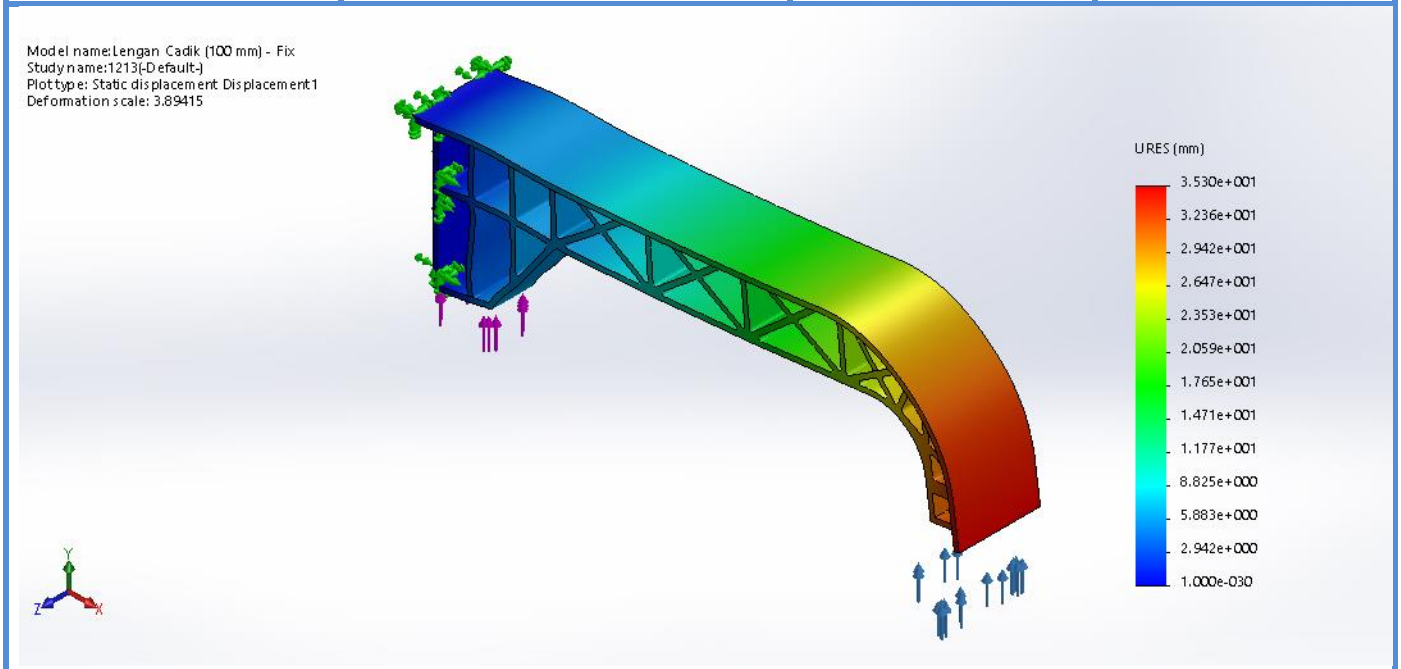
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	2.531e+001N/m^2 Node: 9922	2.034e+007N/m^2 Node: 3690



Lengan Cadik (100 mm) - Fix-1213-Stress-Stress1

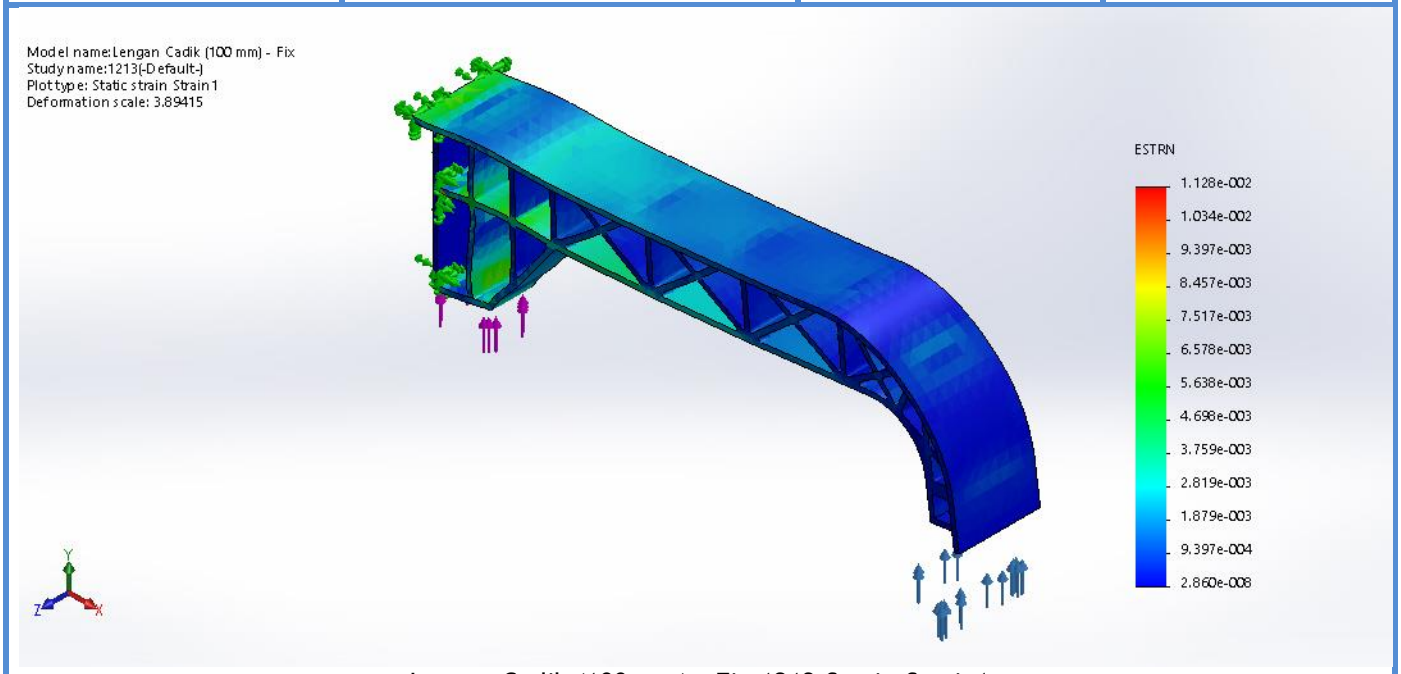
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 446	3.530e+001mm Node: 17621



Lengan Cadik (100 mm) - Fix-1213-Displacement-Displacement1

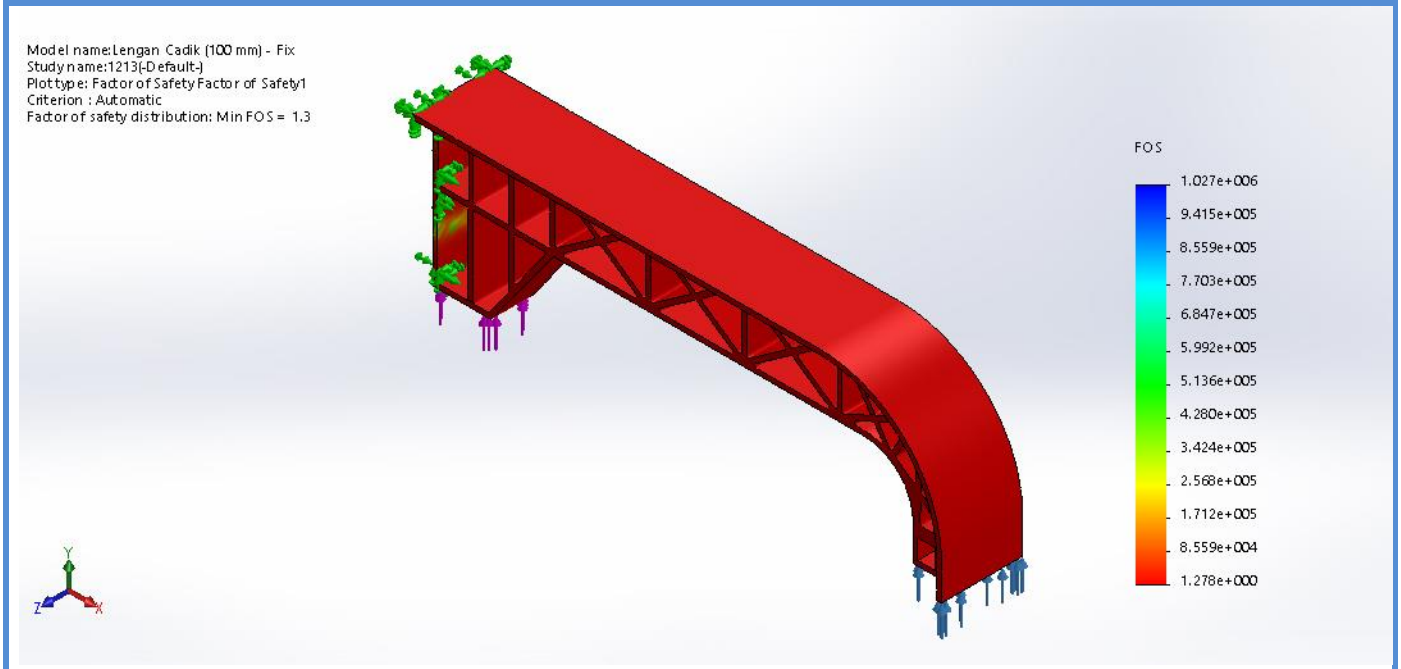
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	2.860e-008 Element: 10641	1.128e-002 Element: 1459

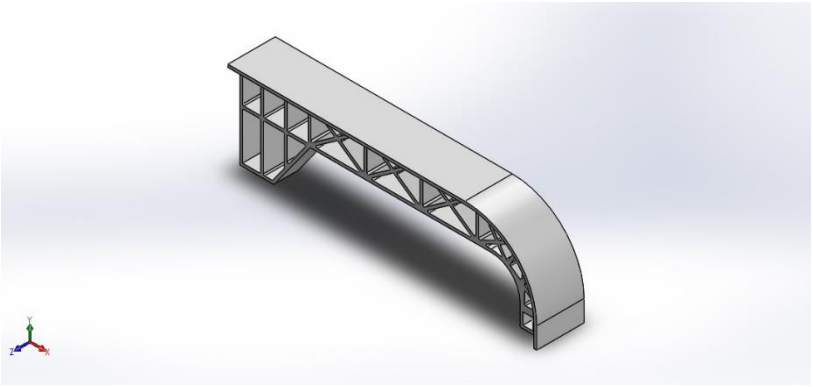


Lengan Cadik (100 mm) - Fix-1213-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.278e+000 Node: 3690	1.027e+006 Node: 9922



Lengan Cadik (100 mm) - Fix-1213-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (100 mm) - Fix

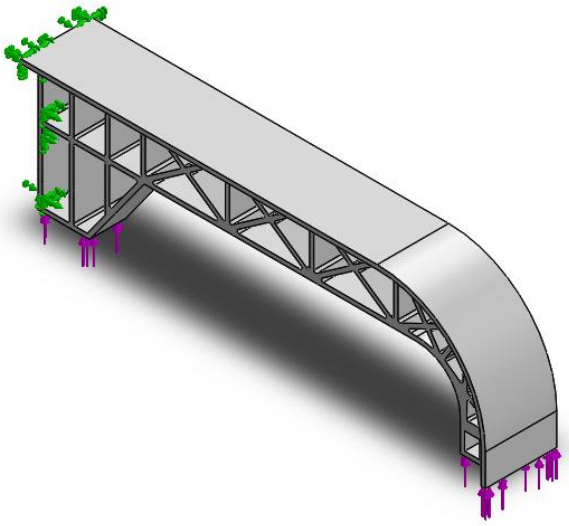
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 1482
Analysis type: Static

Table of Contents

Description

No Data

Model Information



Model name: Lengan Cadik (100 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude2 	Solid Body	**Mass:10.7703 kg** **Volume:0.0113133 m^3** **Density:952 kg/m^3** **Weight:105.549 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (100 mm) - Fix.SLDPRT** Jul 09 07:15:18 2018

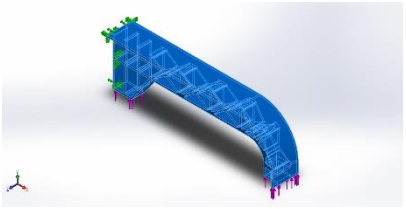
Study Properties

Study name	1482
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	On
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

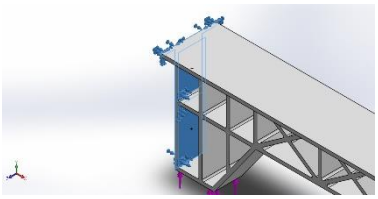
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

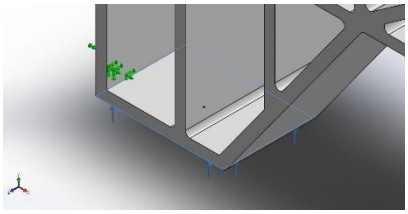
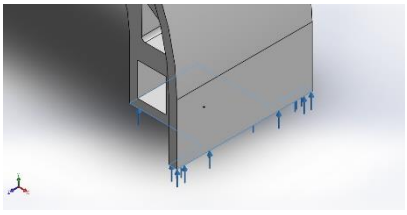
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude2)(Lengan Cadik (100 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-1.68787	-3732.91	0.660065	3732.91
Reaction Moment(N.m)	0	0	0	0

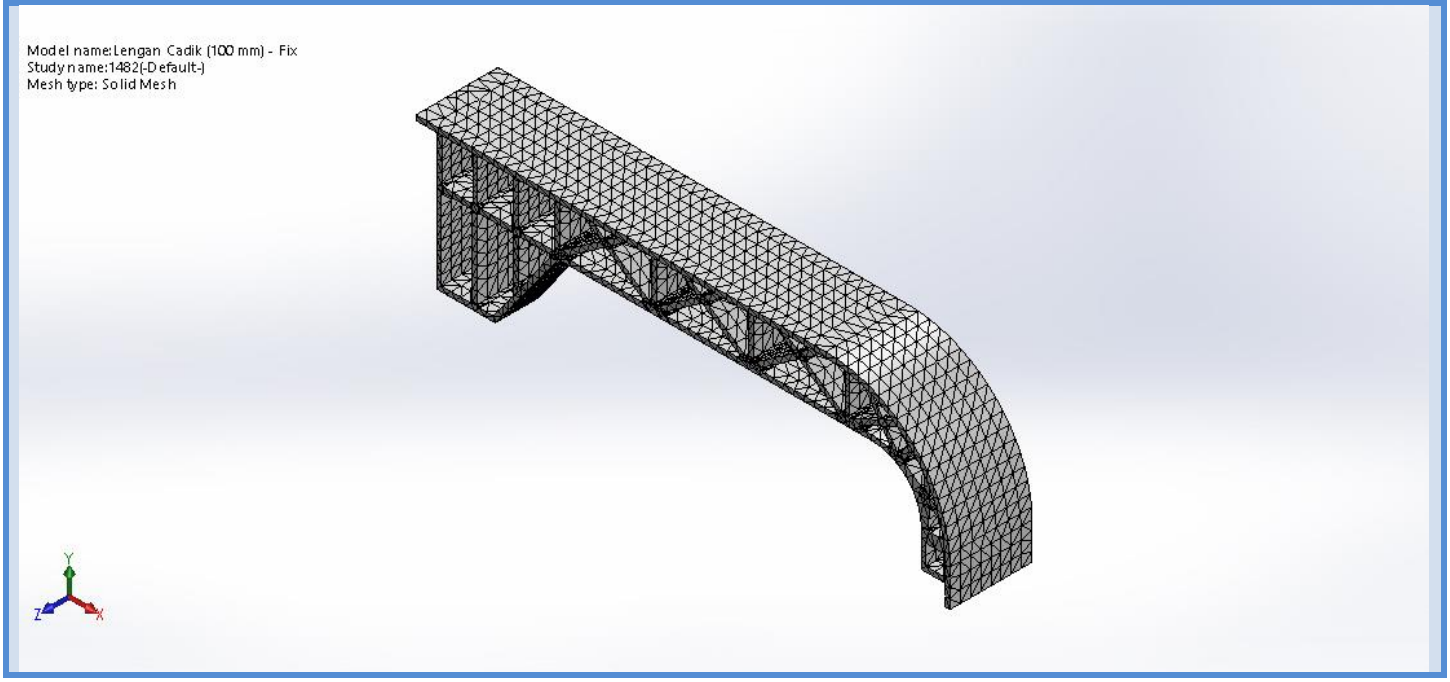
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 1482.27 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	27.1483 mm
Tolerance	1.35742 mm
Mesh Quality Plot	High

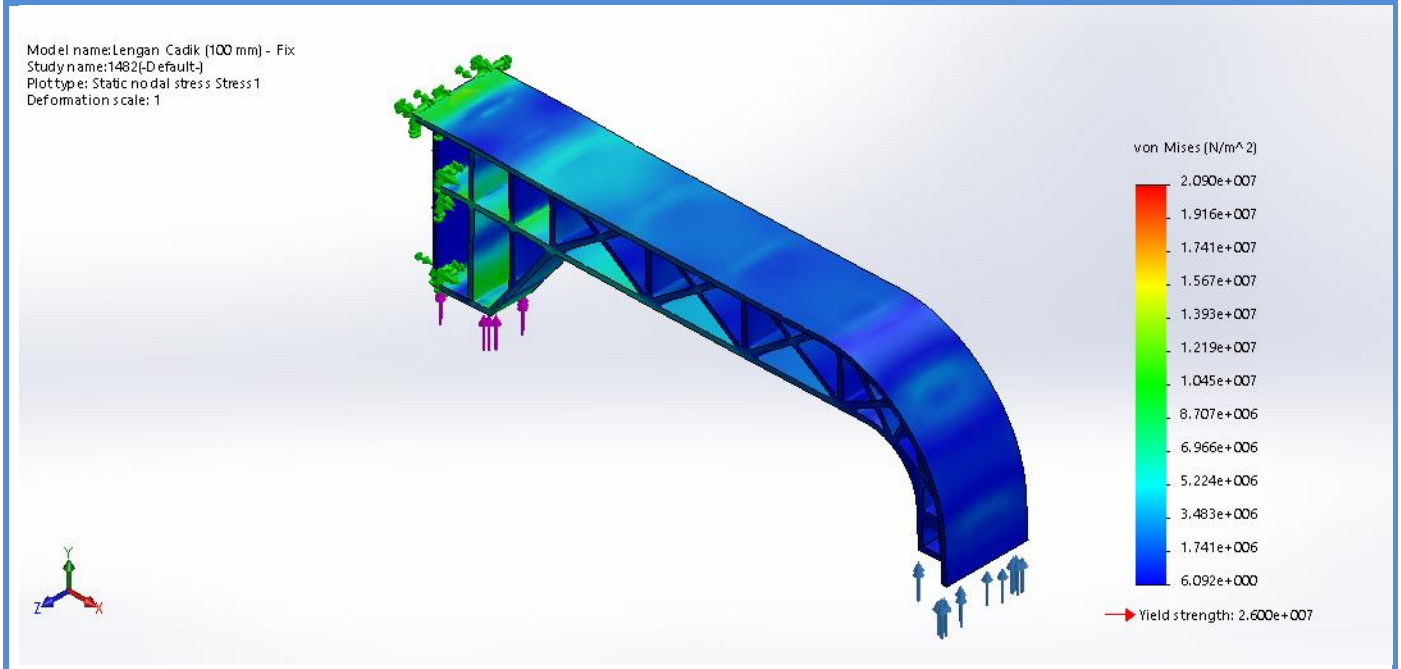
Mesh information - Details

Total Nodes	24625
Total Elements	12208
Maximum Aspect Ratio	28.534
% of elements with Aspect Ratio < 3	66.1
% of elements with Aspect Ratio > 10	0.68
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:03
Computer name:	



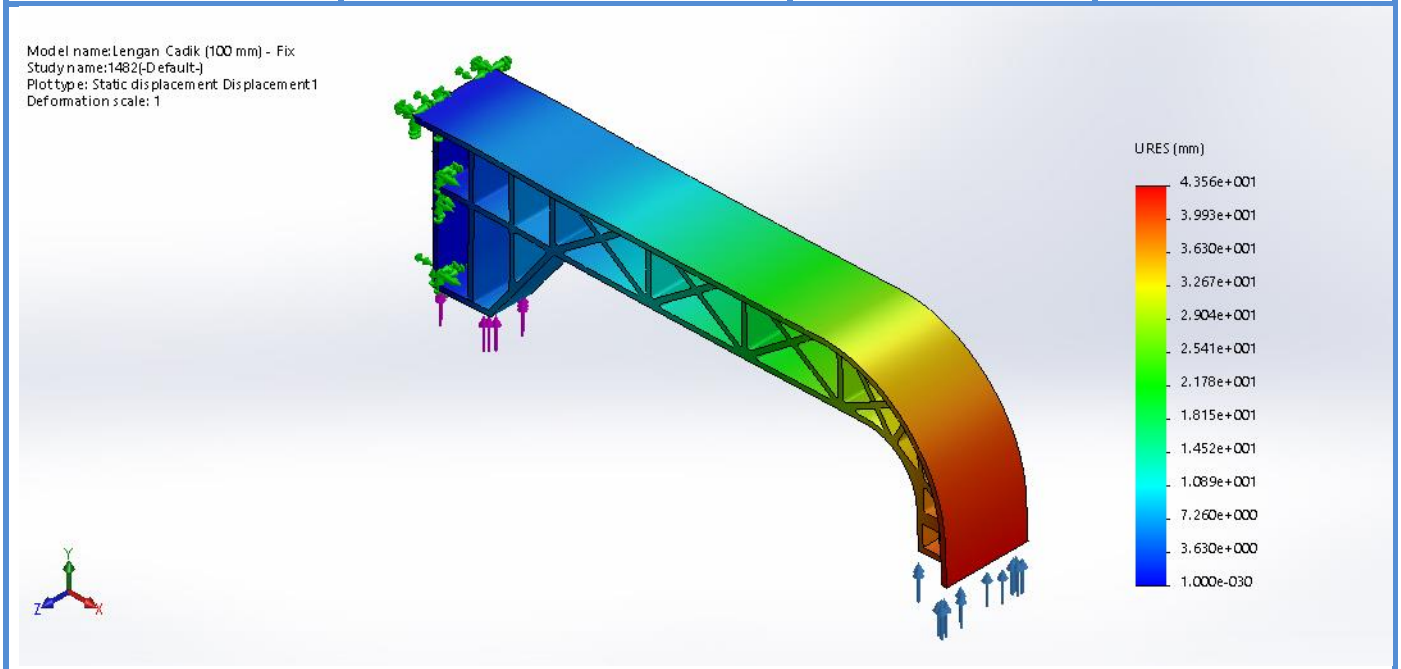
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	6.092e+000N/m^2 Node: 9923	2.090e+007N/m^2 Node: 3690



Lengan Cadik (100 mm) - Fix-1482-Stress-Stress1

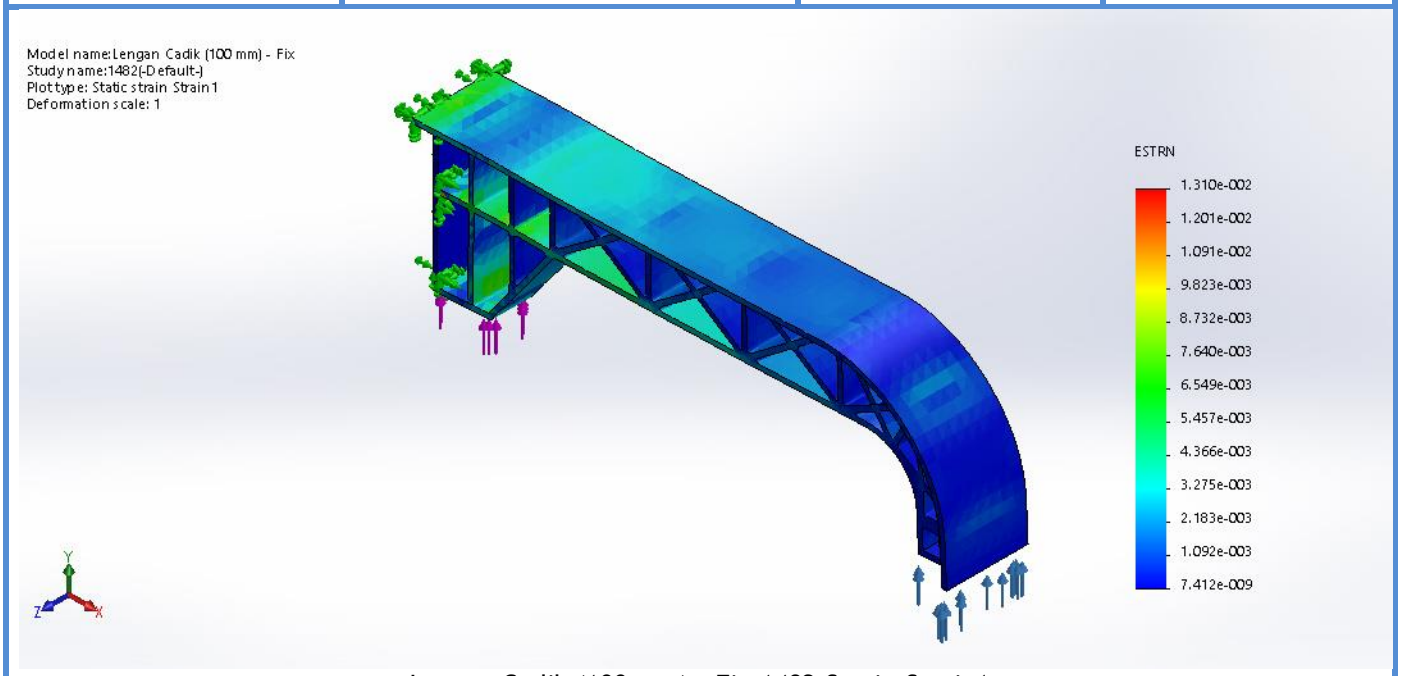
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 446	4.356e+001mm Node: 17621



Lengan Cadik (100 mm) - Fix-1482-Displacement-Displacement1

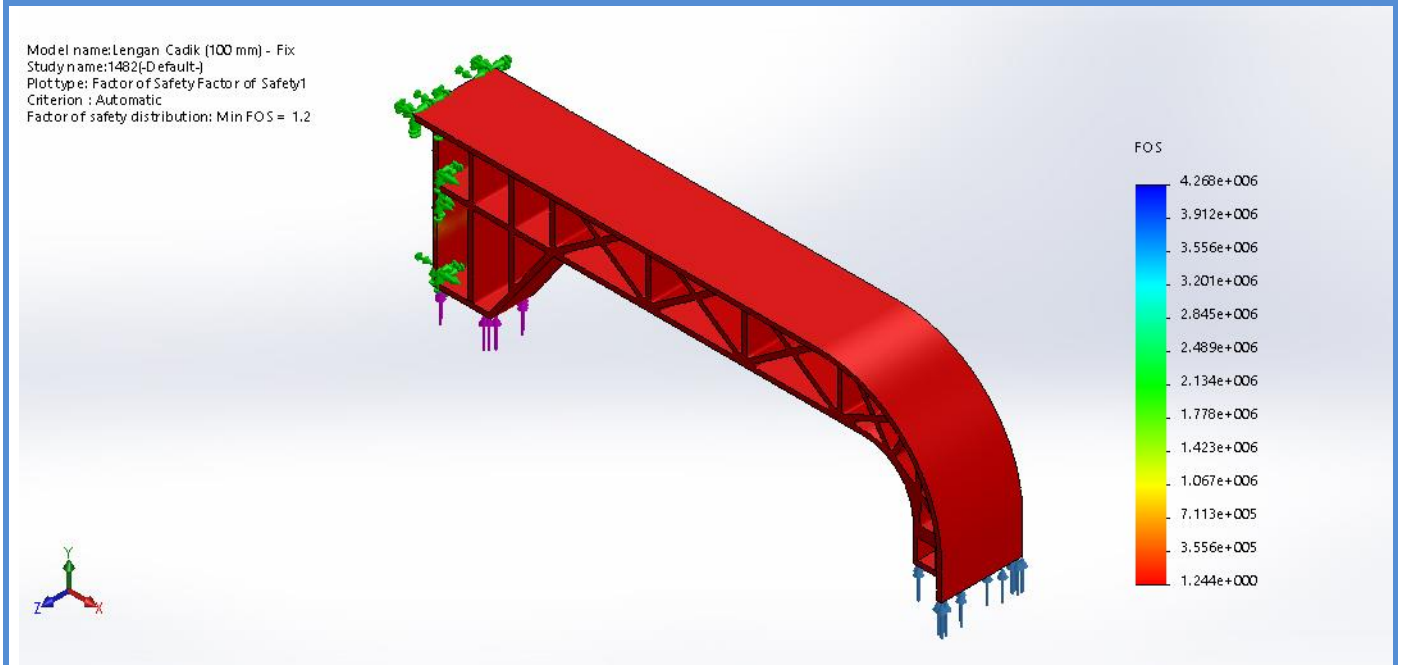
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	7.412e-009 Element: 5948	1.310e-002 Element: 1459

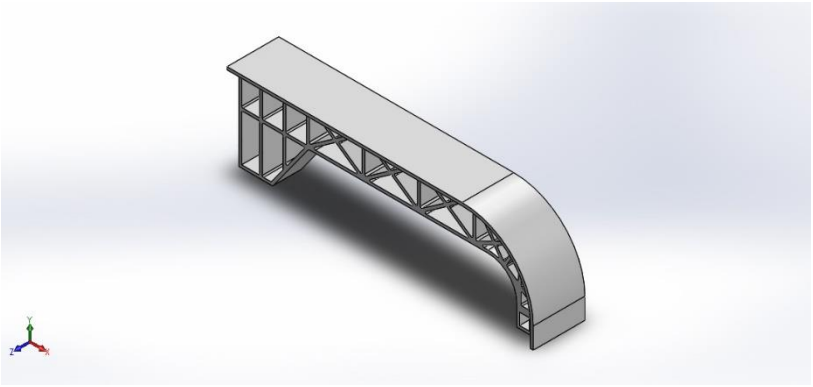


Lengan Cadik (100 mm) - Fix-1482-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.244e+000 Node: 3690	4.268e+006 Node: 9923



Lengan Cadik (100 mm) - Fix-1482-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (120 mm) - Fix

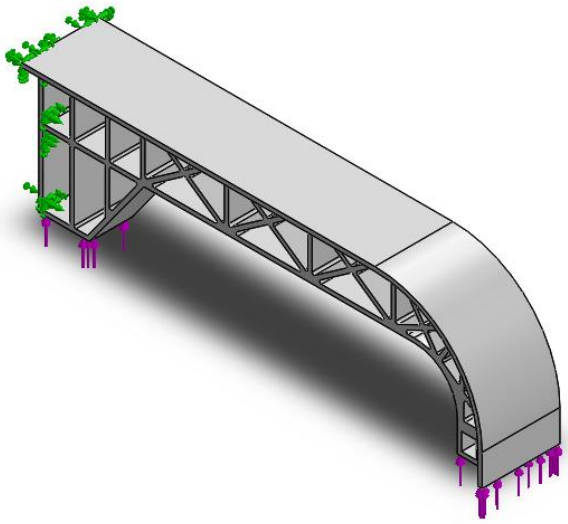
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 133
Analysis type: Static

Table of Contents

Description

No Data

Model Information



Model name: Lengan Cadik (120 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude2 	Solid Body	**Mass:12.5686 kg** **Volume:0.0132024 m^3** **Density:952 kg/m^3** **Weight:123.173 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (120 mm) - Fix.SLDPRT** Jul 09 09:01:29 2018

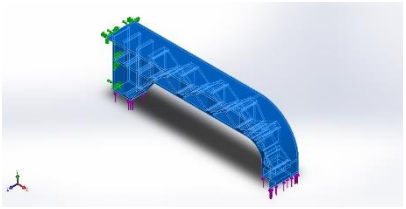
Study Properties

Study name	133
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

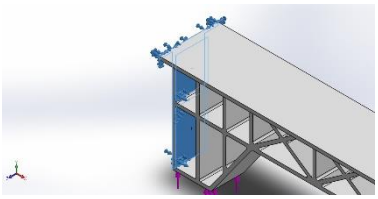
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

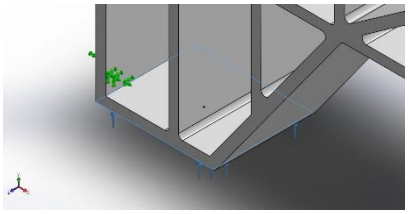
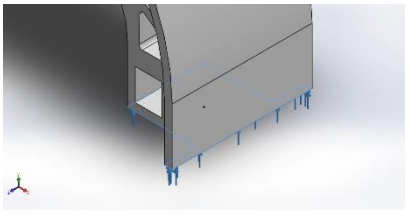
Model Reference	Properties		Components
	**Name:** **Model type:** **Default failure criterion:** **Yield strength:** **Tensile strength:** **Elastic modulus:** **Poisson's ratio:** **Mass density:** **Shear modulus:**	Custom Plastic Linear Elastic Isotropic Unknown 2.6e+007 N/m^2 2.21e+007 N/m^2 1.07e+009 N/m^2 0.4101 952 kg/m^3 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude2)(Lengan Cadik (120 mm) - Fix)
Curve Data:N/A			

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-0.860056	-2384.61	-0.585197	2384.61
Reaction Moment(N.m)	0	0	0	0

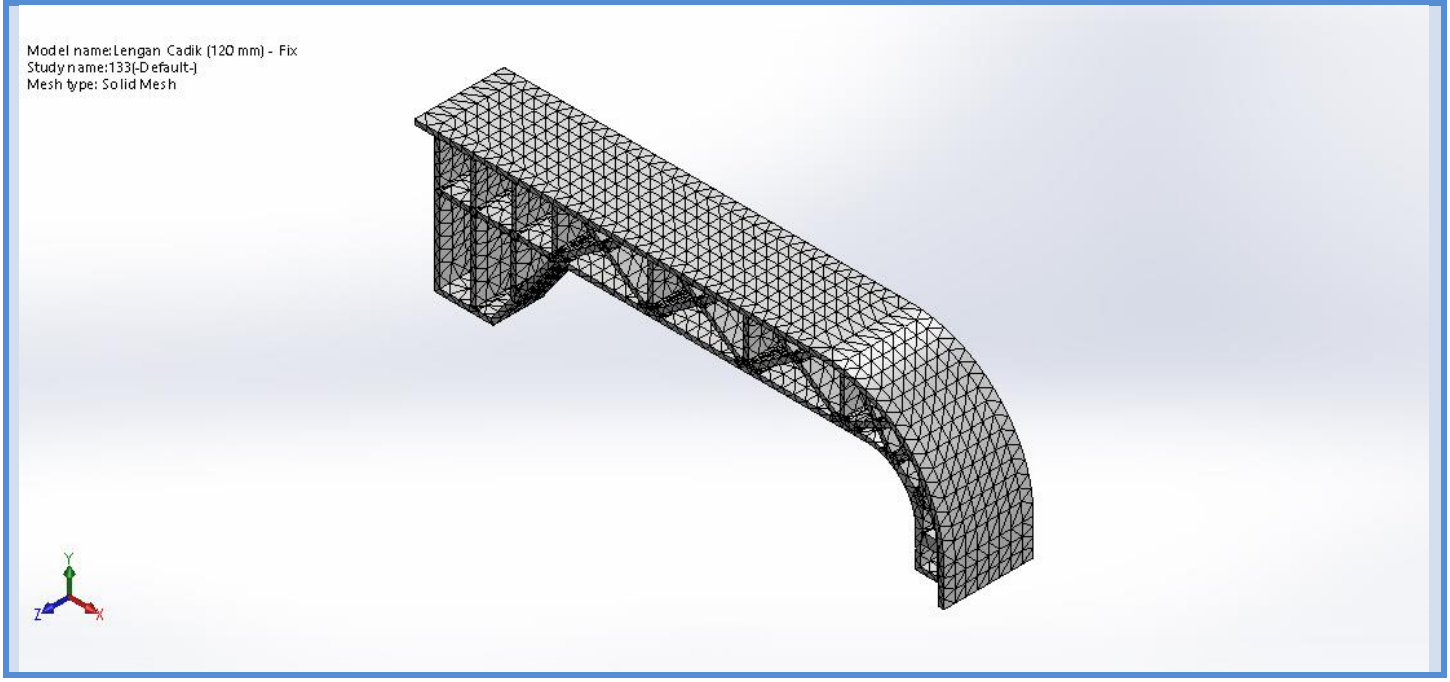
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 133.55 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	29.0559 mm
Tolerance	1.4528 mm
Mesh Quality Plot	High

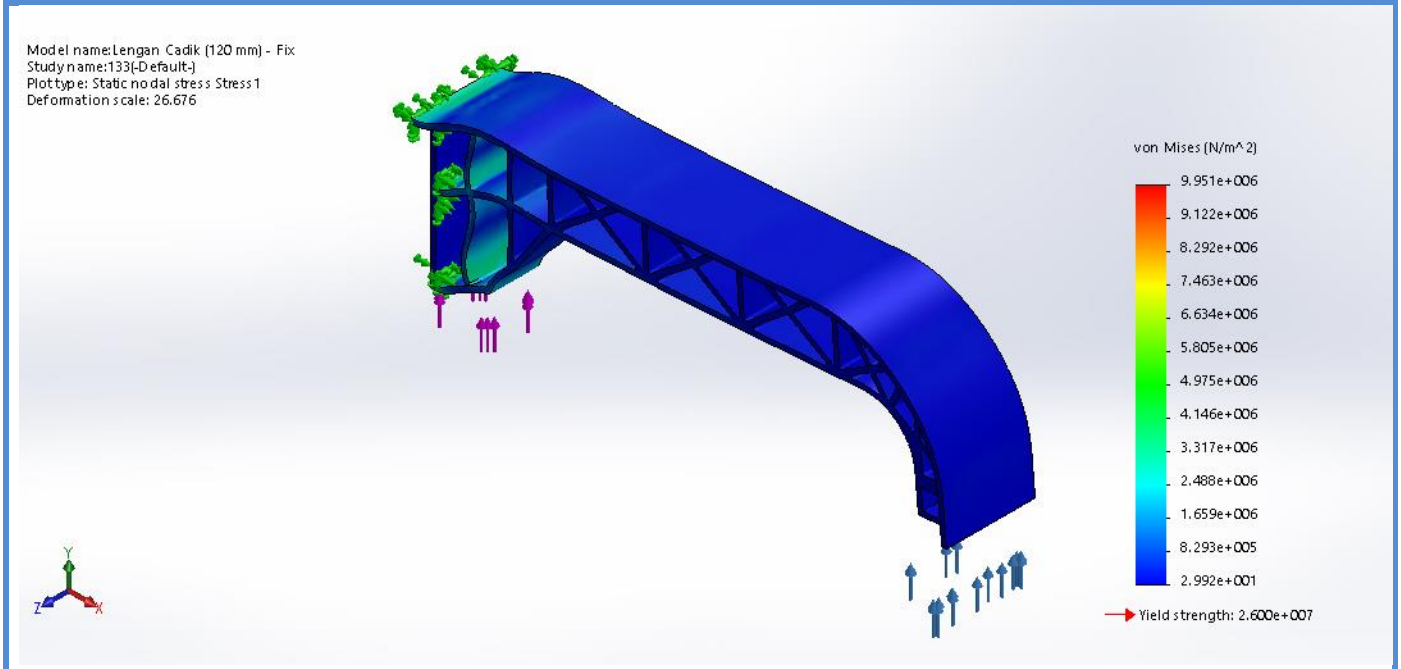
Mesh information - Details

Total Nodes	25767
Total Elements	12836
Maximum Aspect Ratio	21.081
% of elements with Aspect Ratio < 3	61.3
% of elements with Aspect Ratio > 10	0.561
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



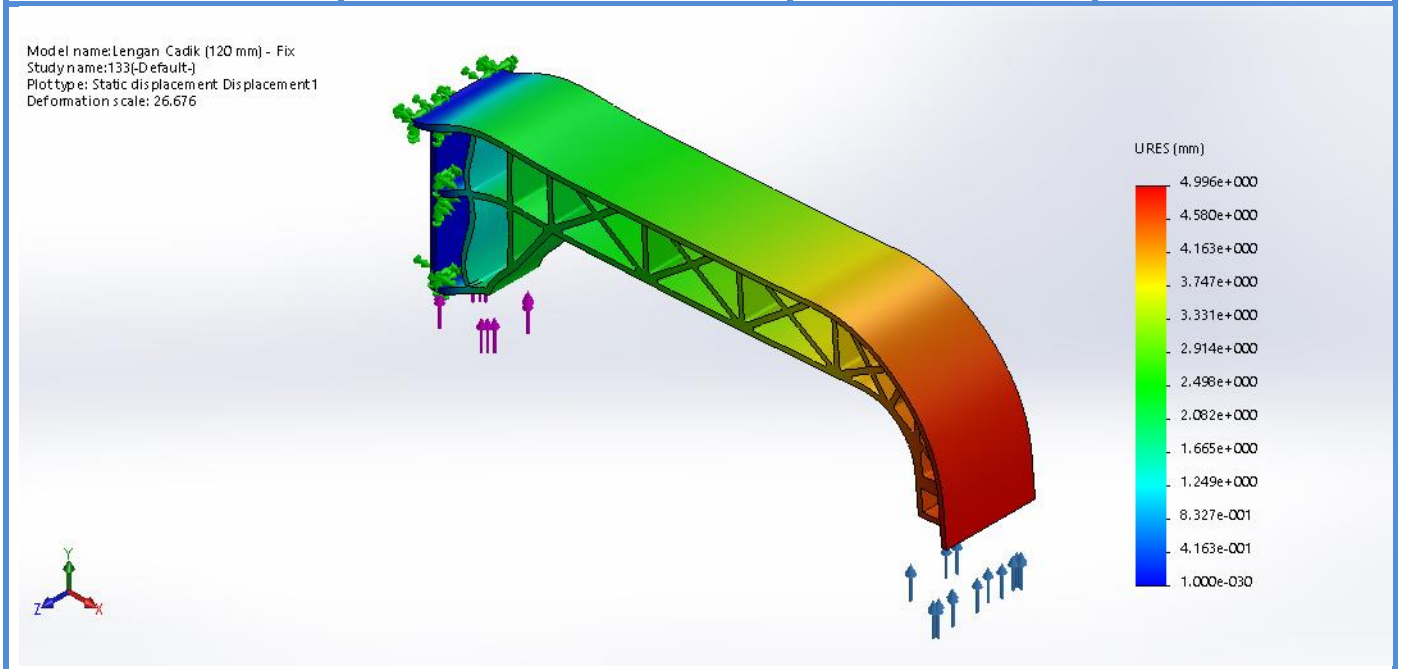
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	2.992e+001N/m^2 Node: 11482	9.951e+006N/m^2 Node: 3875



Lengan Cadik (120 mm) - Fix-133-Stress-Stress1

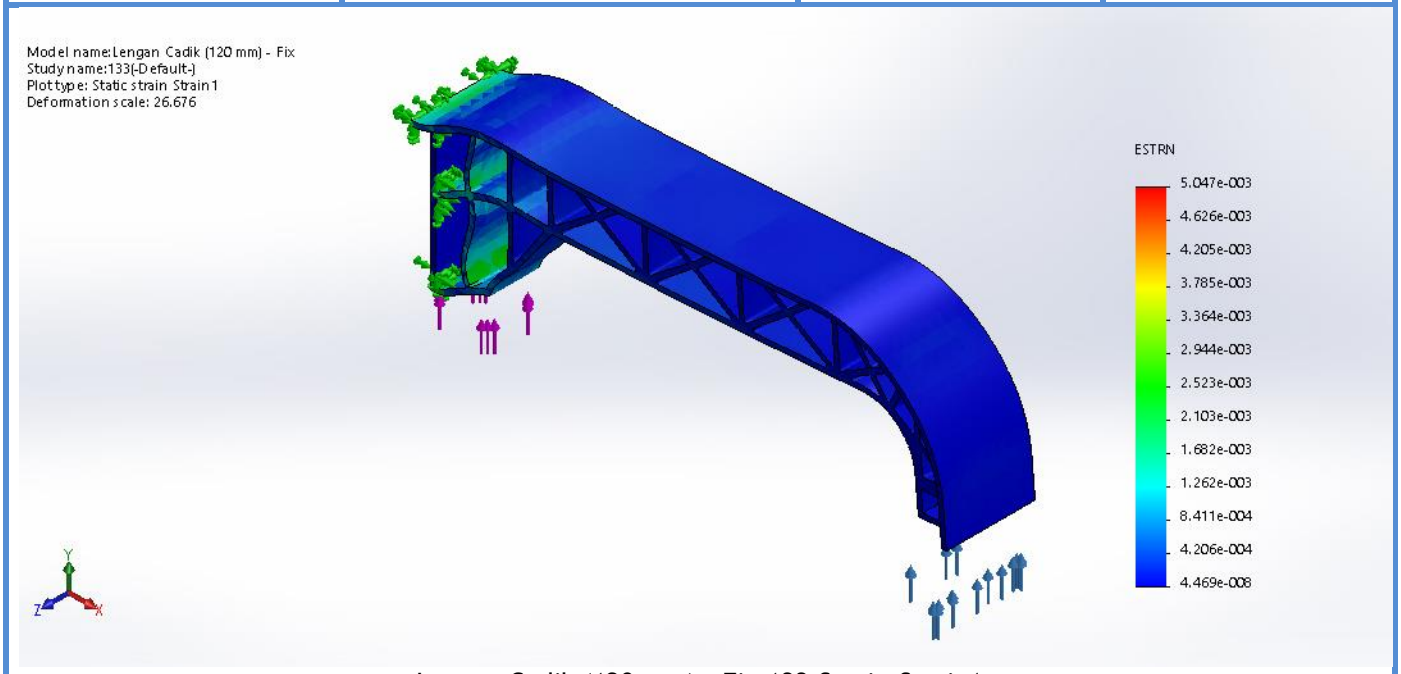
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 512	4.996e+000mm Node: 18119



Lengan Cadik (120 mm) - Fix-133-Displacement-Displacement1

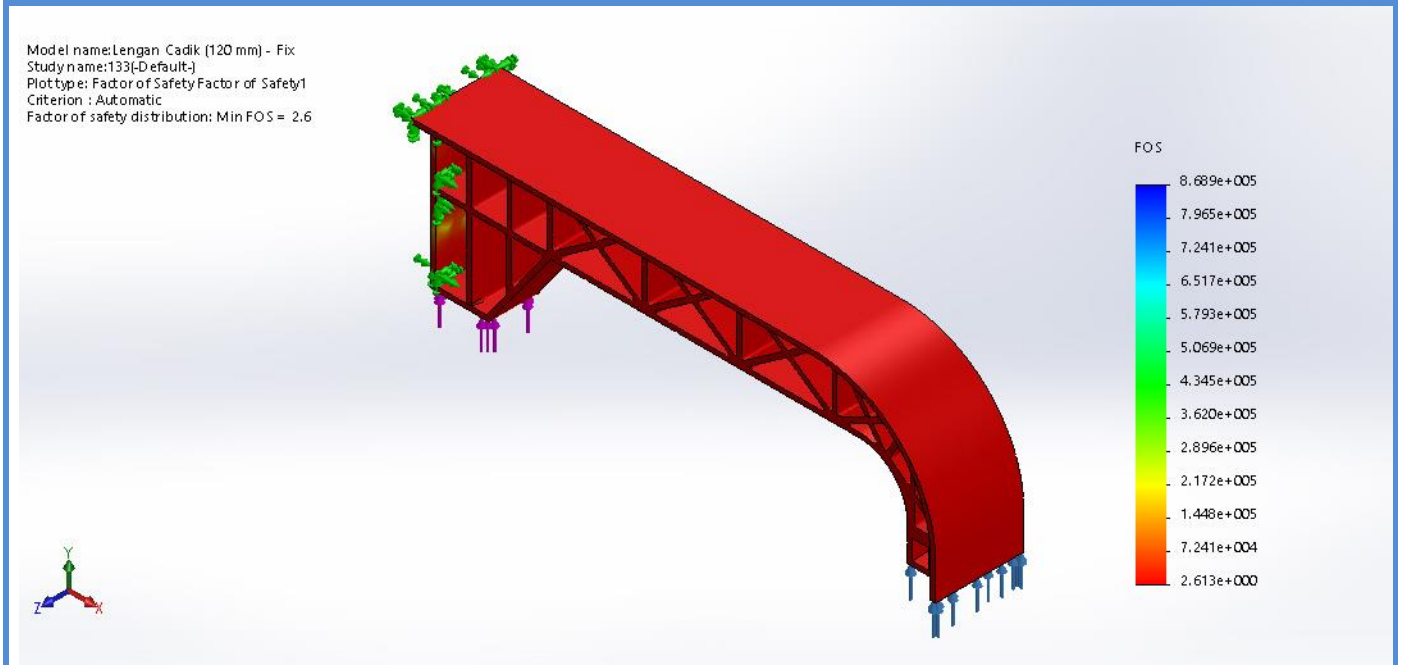
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	4.469e-008 Element: 3732	5.047e-003 Element: 10755

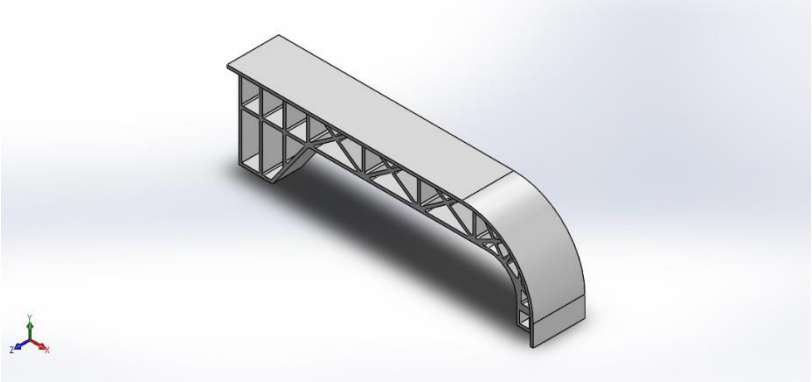


Lengan Cadik (120 mm) - Fix-133-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	2.613e+000 Node: 3875	8.689e+005 Node: 11482



Lengan Cadik (120 mm) - Fix-133-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (120 mm) - Fix

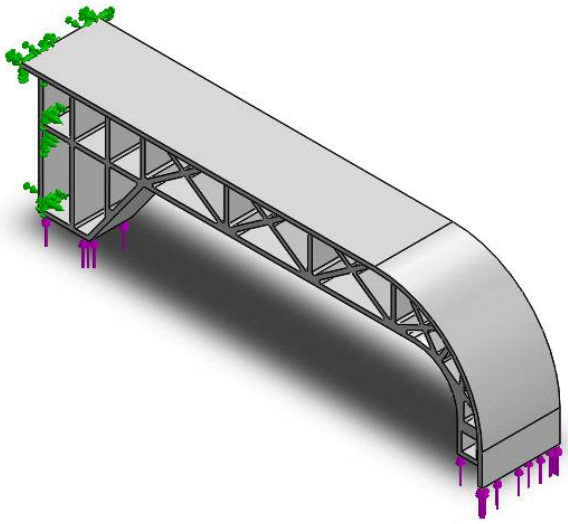
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 361
Analysis type: Static

Table of Contents

Description

No Data

Model Information



Model name: Lengan Cadik (120 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude2 	Solid Body	**Mass:12.5686 kg** **Volume:0.0132024 m^3** **Density:952 kg/m^3** **Weight:123.173 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (120 mm) - Fix.SLDPRT** Jul 09 09:01:29 2018

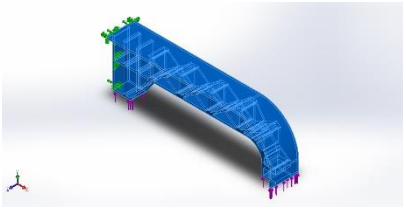
Study Properties

Study name	361
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

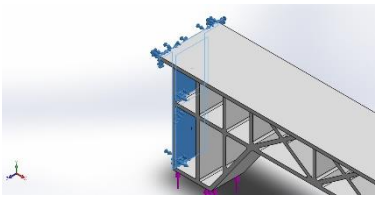
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

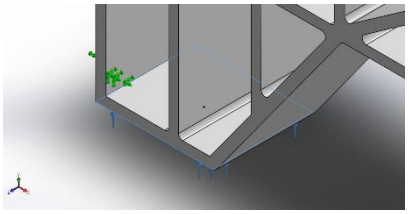
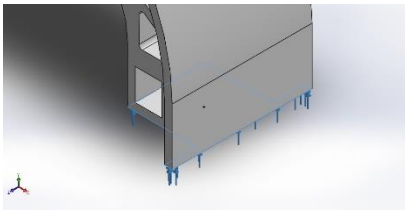
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude2)(Lengan Cadik (120 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	3.685	-2611.16	0.977425	2611.16
Reaction Moment(N.m)	0	0	0	0

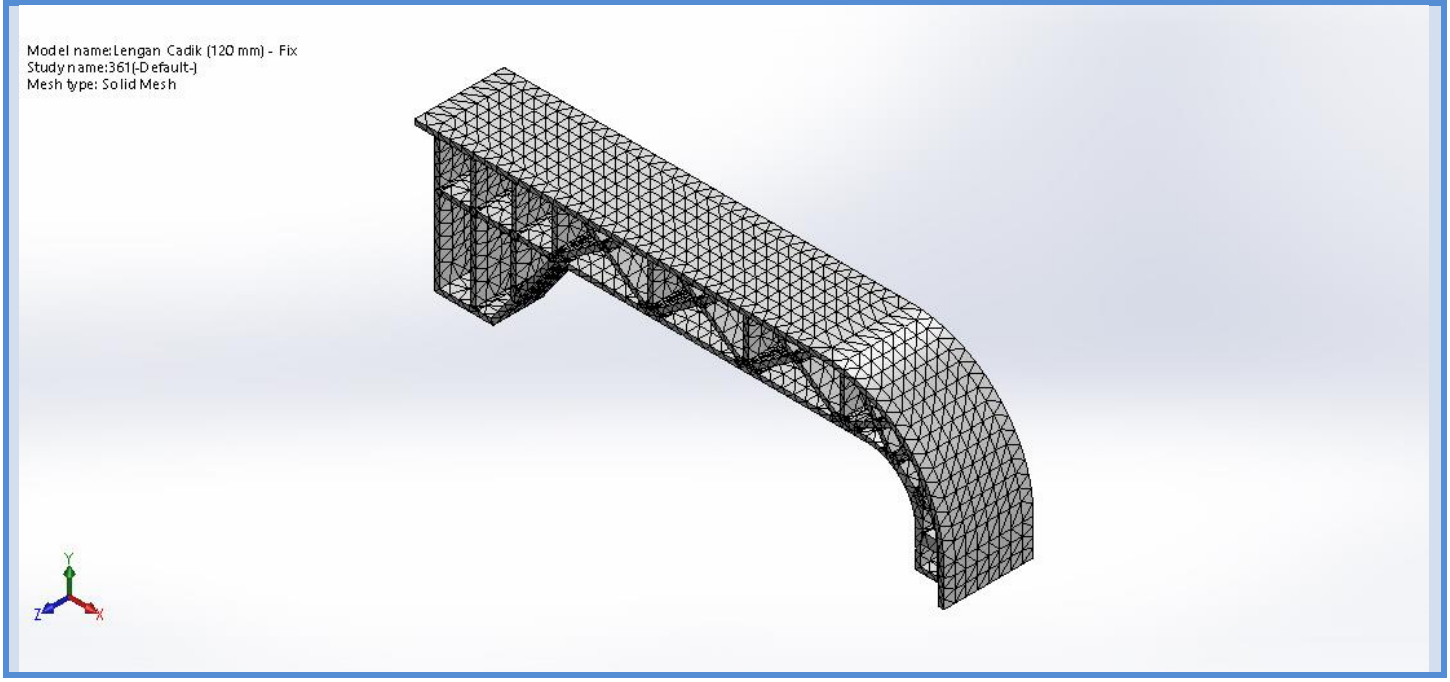
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 361.67 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	29.0559 mm
Tolerance	1.4528 mm
Mesh Quality Plot	High

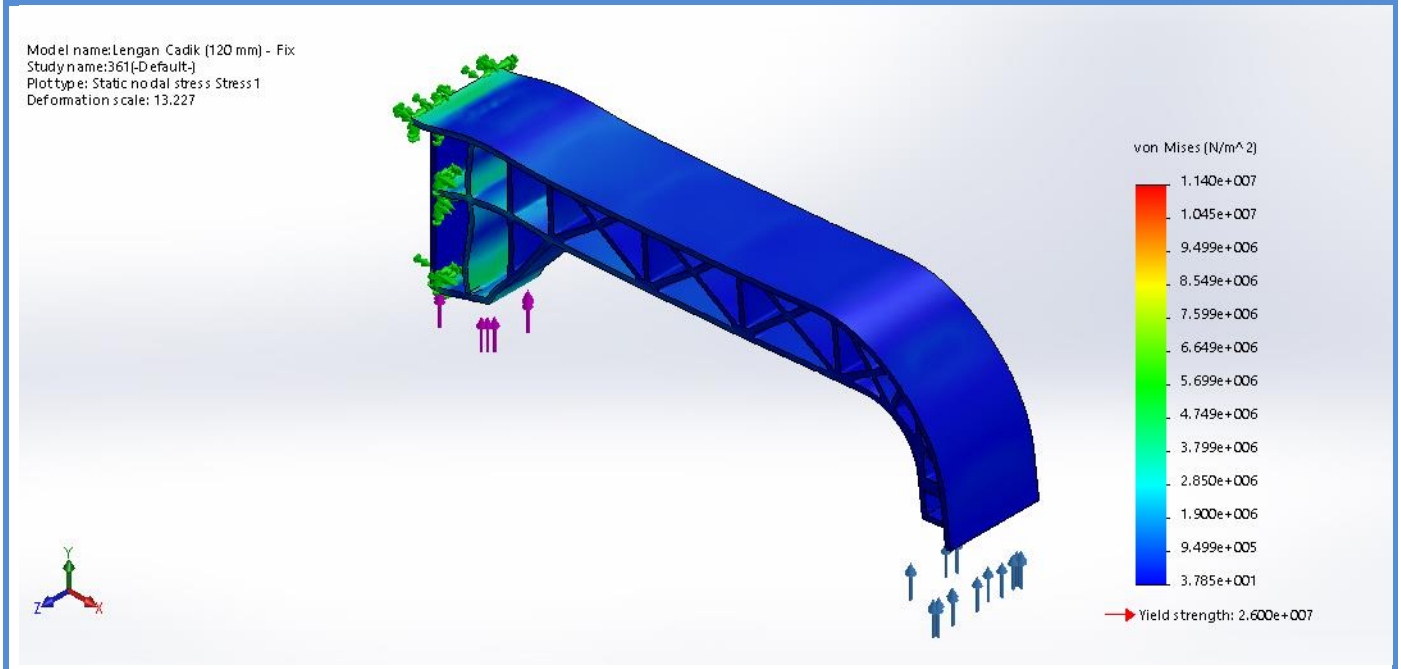
Mesh information - Details

Total Nodes	25767
Total Elements	12836
Maximum Aspect Ratio	21.081
% of elements with Aspect Ratio < 3	61.3
% of elements with Aspect Ratio > 10	0.561
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



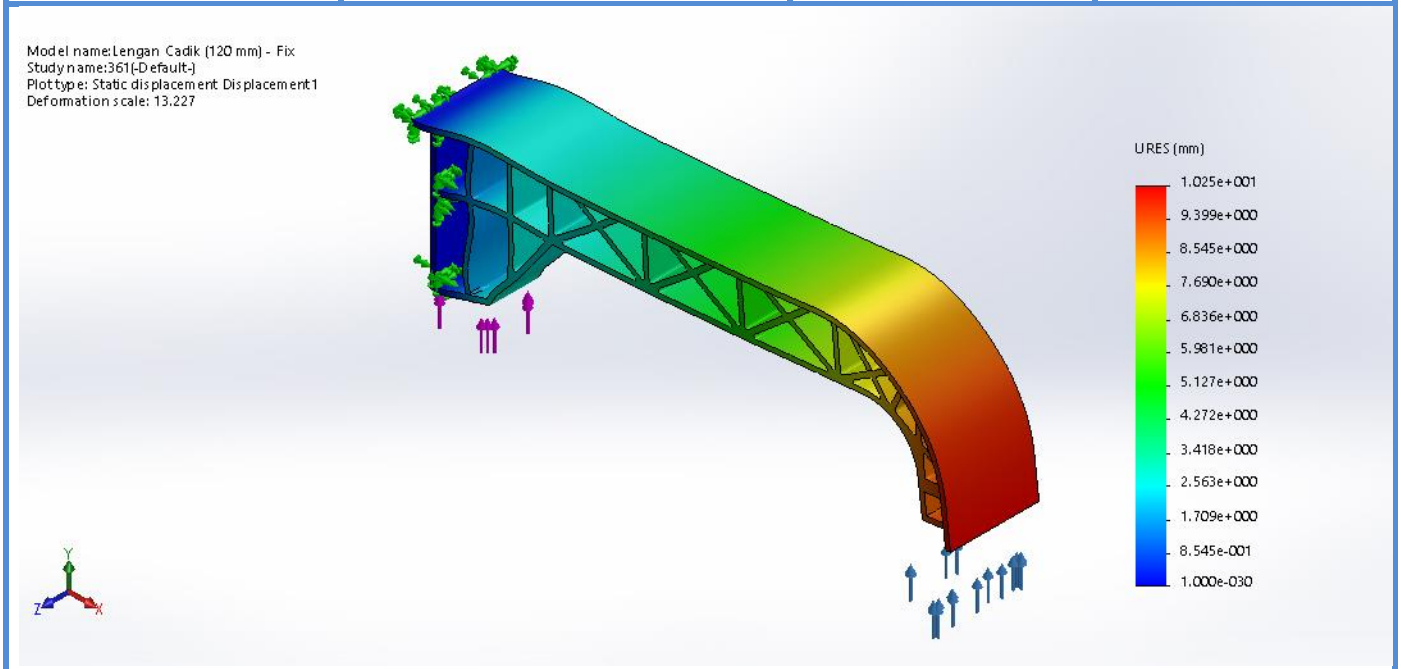
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	3.785e+001N/m^2 Node: 11455	1.140e+007N/m^2 Node: 3875



Lengan Cadik (120 mm) - Fix-361-Stress-Stress1

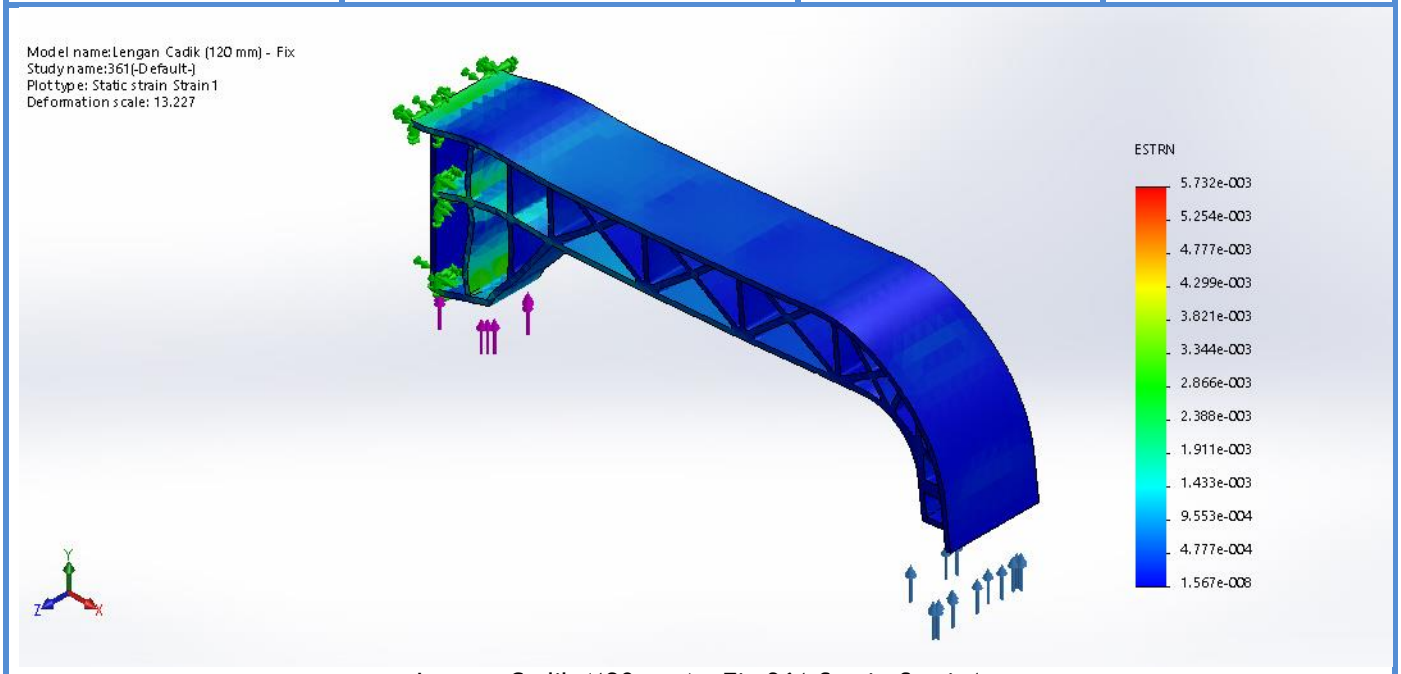
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 512	1.025e+001mm Node: 18115



Lengan Cadik (120 mm) - Fix-361-Displacement-Displacement1

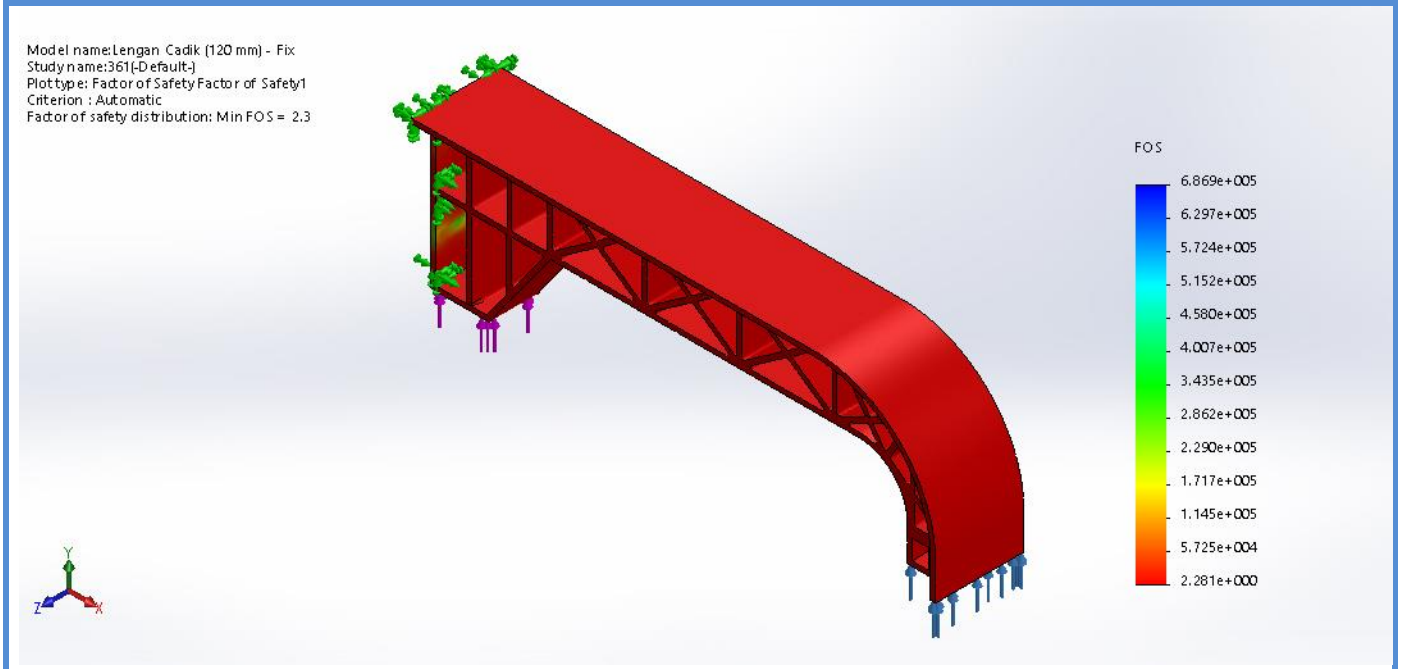
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	1.567e-008 Element: 8326	5.732e-003 Element: 10755

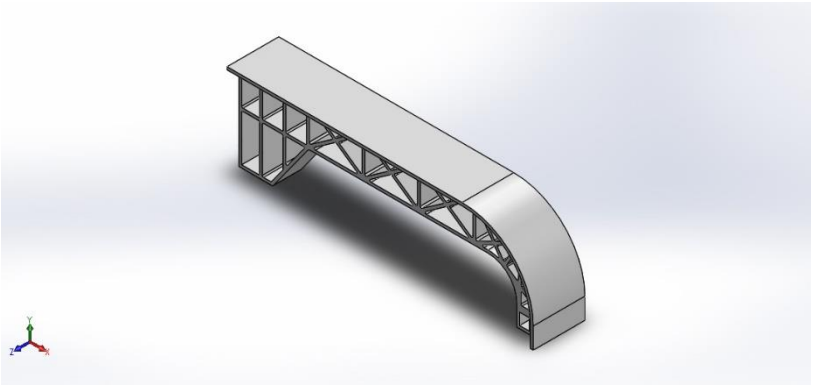


Lengan Cadik (120 mm) - Fix-361-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	2.281e+000 Node: 3875	6.869e+005 Node: 11455



Lengan Cadik (120 mm) - Fix-361-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (120 mm) - Fix

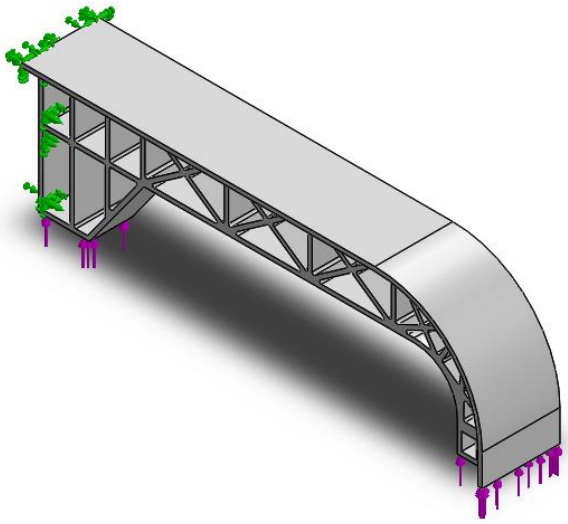
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 633
Analysis type: Static

Table of Contents

Description

No Data

Model Information



Model name: Lengan Cadik (120 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude2 	Solid Body	**Mass:12.5686 kg** **Volume:0.0132024 m^3** **Density:952 kg/m^3** **Weight:123.173 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (120 mm) - Fix.SLDPRT** Jul 09 09:01:29 2018

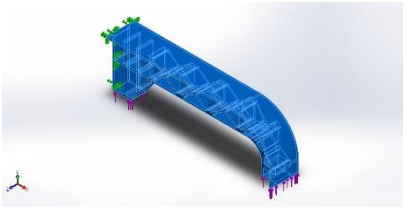
Study Properties

Study name	633
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

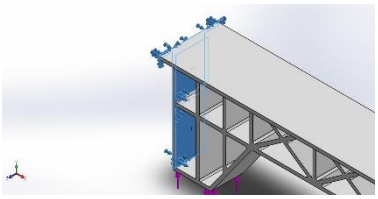
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

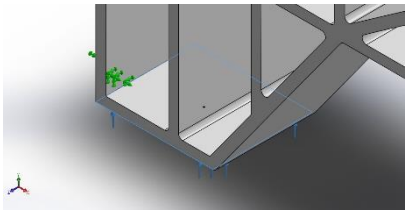
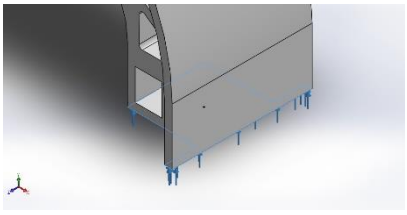
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude2)(Lengan Cadik (120 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	2.5138	-2883.99	1.18409	2883.99
Reaction Moment(N.m)	0	0	0	0

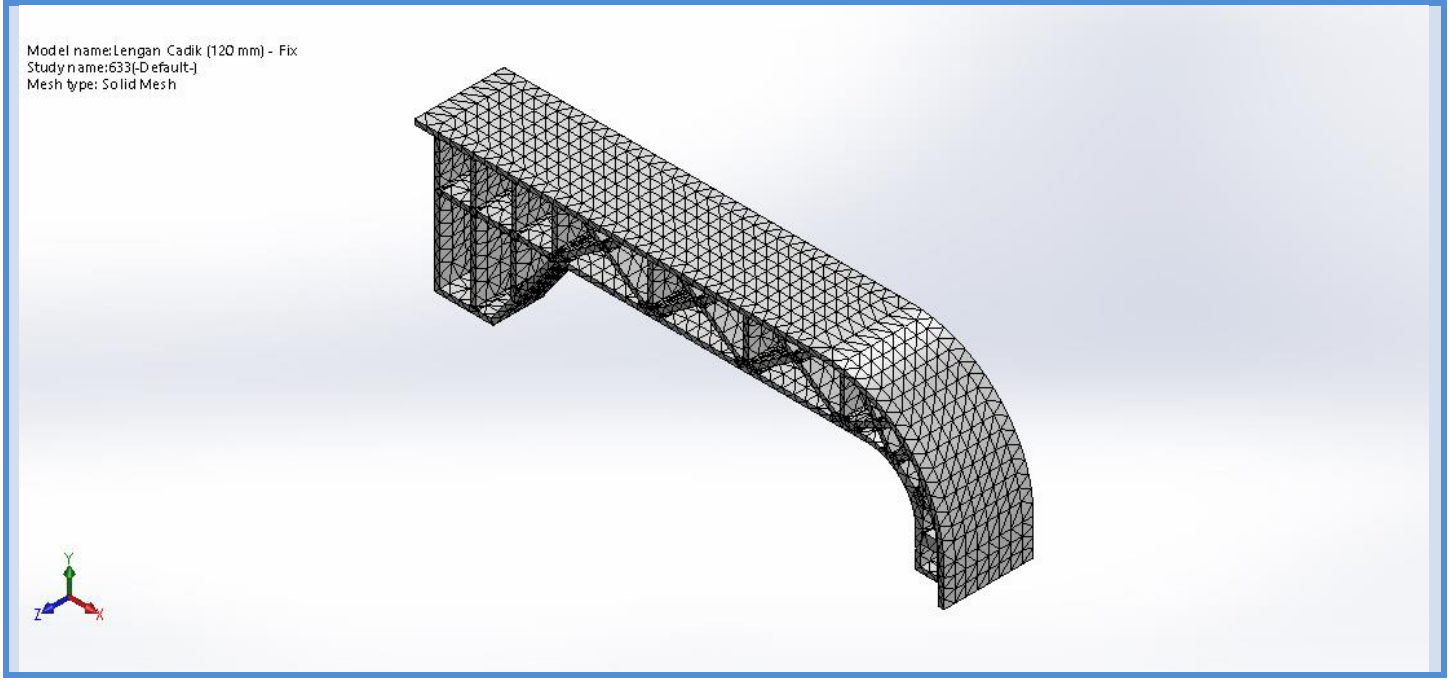
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 633.36 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	29.0559 mm
Tolerance	1.4528 mm
Mesh Quality Plot	High

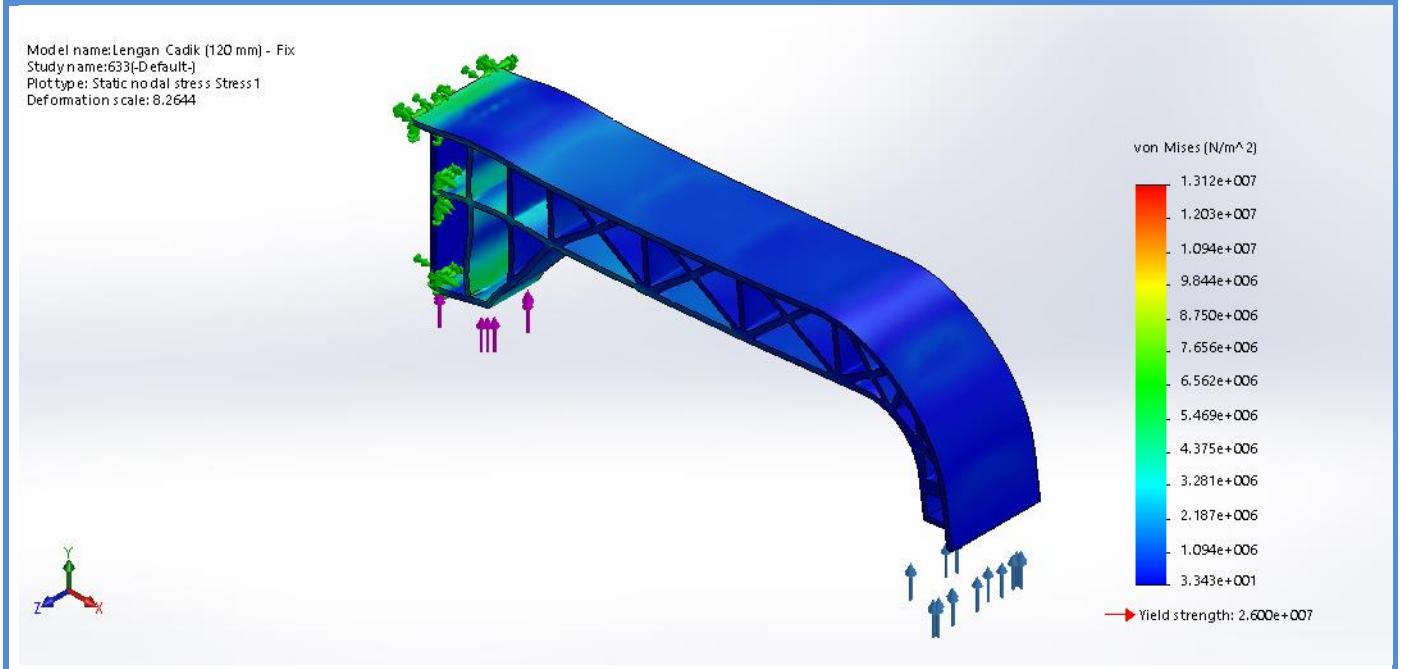
Mesh information - Details

Total Nodes	25767
Total Elements	12836
Maximum Aspect Ratio	21.081
% of elements with Aspect Ratio < 3	61.3
% of elements with Aspect Ratio > 10	0.561
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



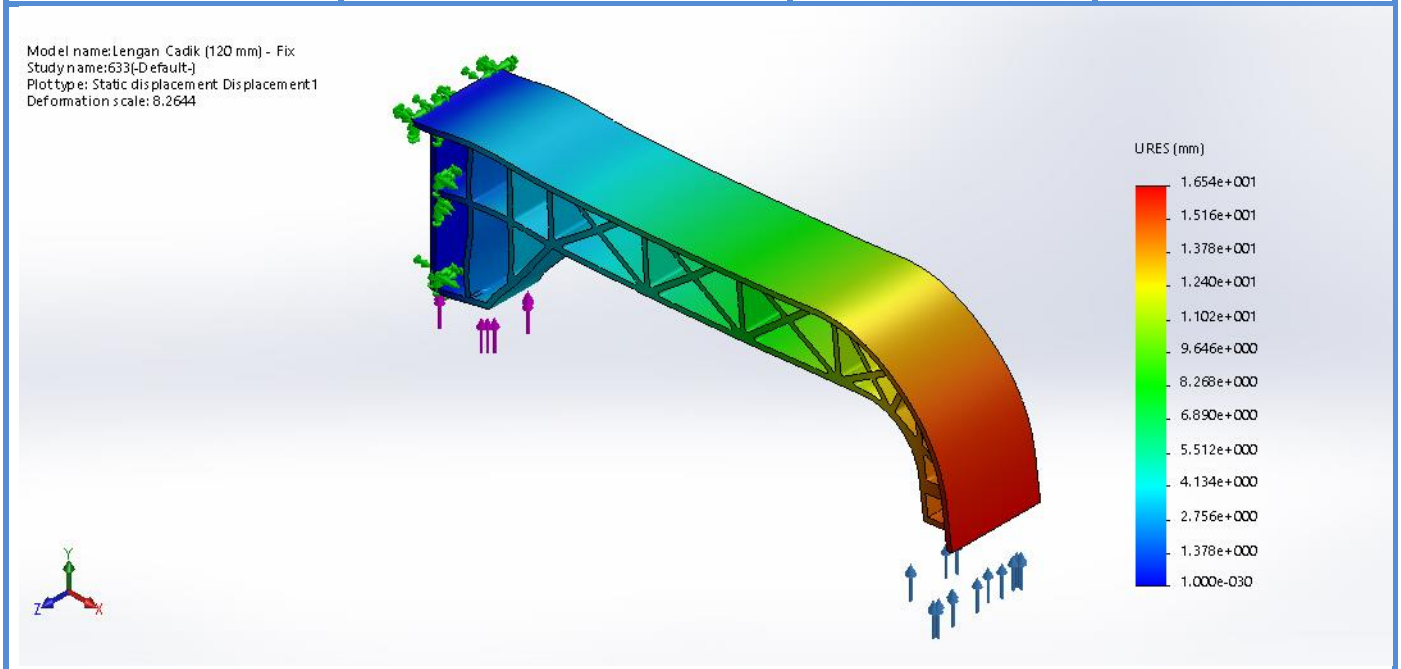
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	3.343e+001N/m^2 Node: 11487	1.312e+007N/m^2 Node: 3875



Lengan Cadik (120 mm) - Fix-633-Stress-Stress1

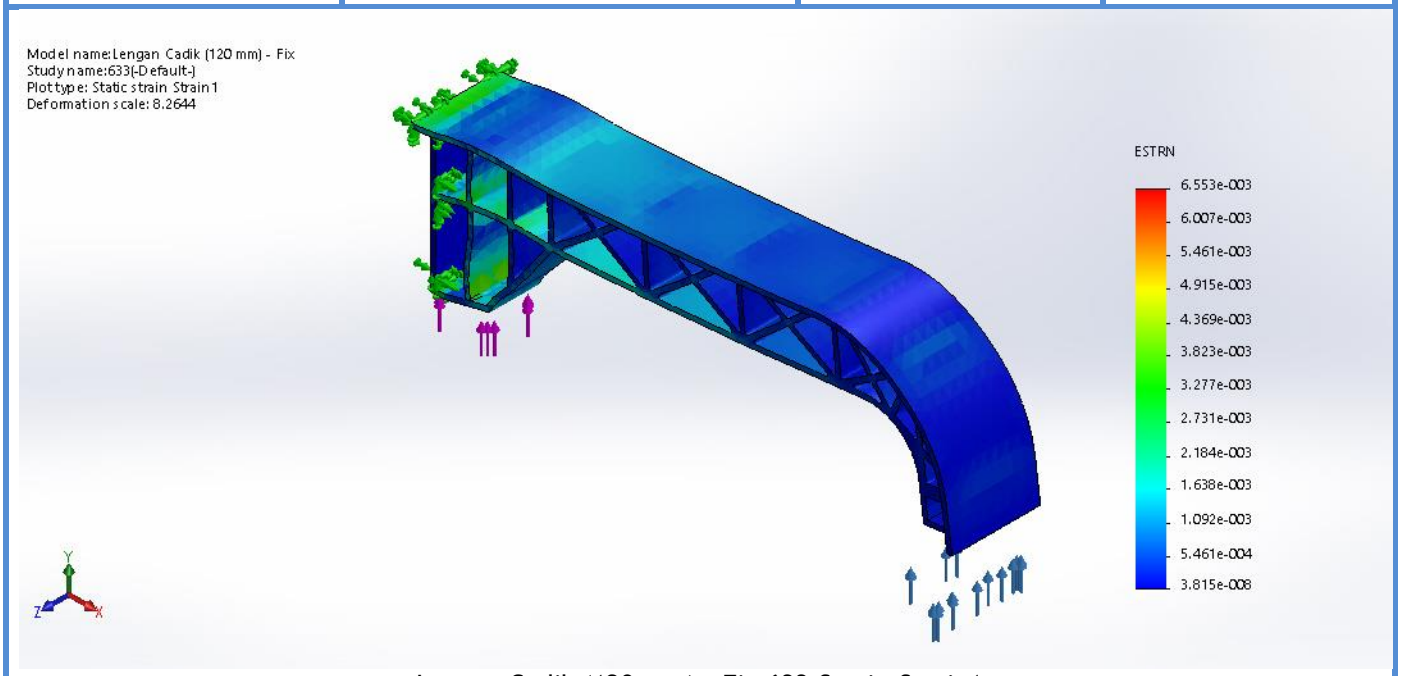
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 512	1.654e+001mm Node: 18115



Lengan Cadik (120 mm) - Fix-633-Displacement-Displacement1

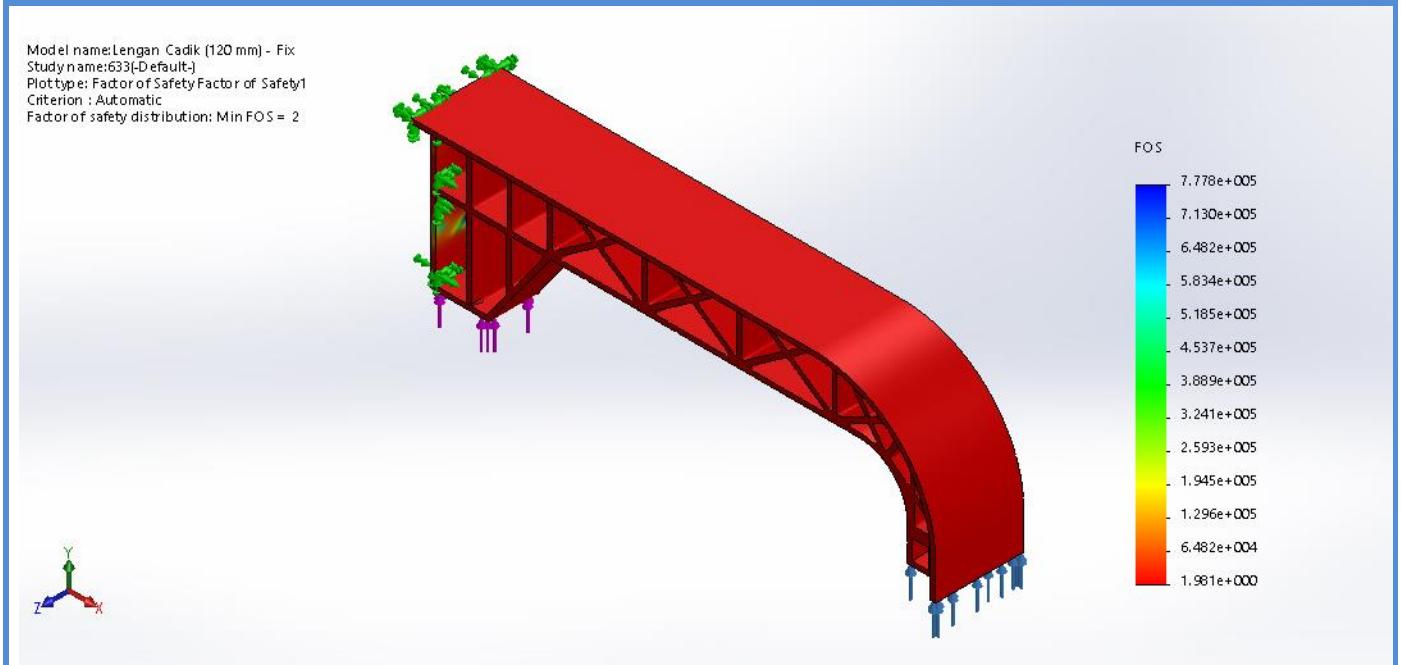
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	3.815e-008 Element: 7050	6.553e-003 Element: 10755

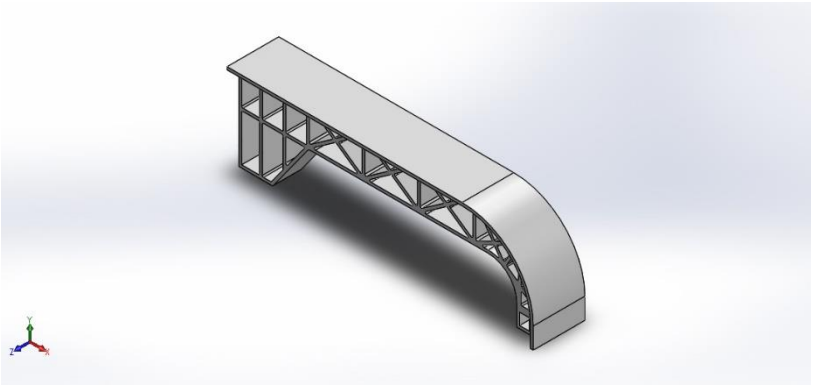


Lengan Cadik (120 mm) - Fix-633-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.981e+000 Node: 3875	7.778e+005 Node: 11487



Lengan Cadik (120 mm) - Fix-633-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (120 mm) - Fix

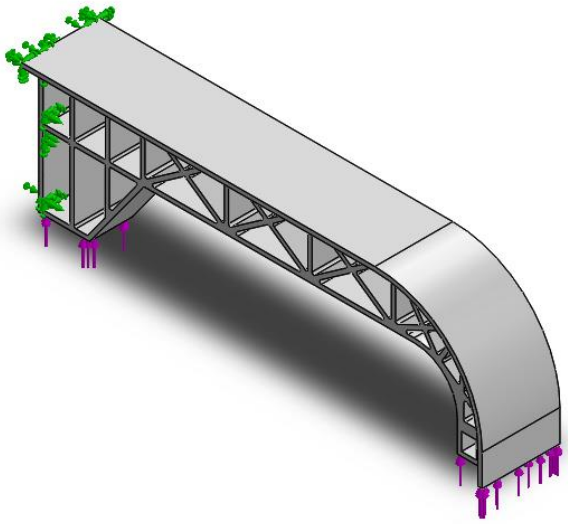
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 916
Analysis type: Static

Table of Contents

Description

No Data

Model Information



Model name: Lengan Cadik (120 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude2 	Solid Body	**Mass:12.5686 kg** **Volume:0.0132024 m^3** **Density:952 kg/m^3** **Weight:123.173 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (120 mm) - Fix.SLDPRT** Jul 09 09:01:29 2018

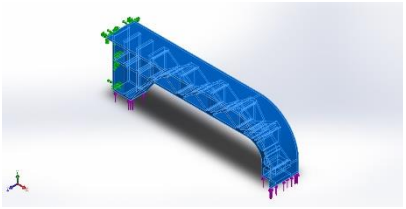
Study Properties

Study name	916
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

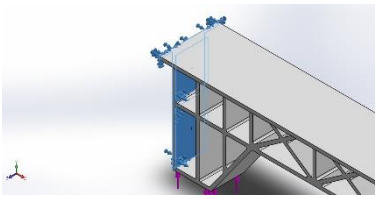
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

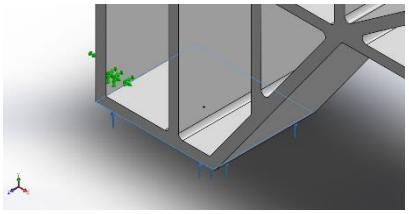
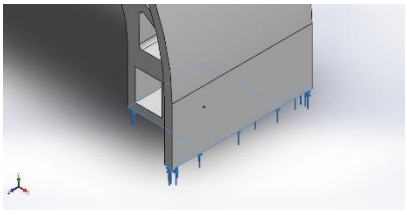
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude2)(Lengan Cadik (120 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-1.19164	-3165.98	0.745461	3165.98
Reaction Moment(N.m)	0	0	0	0

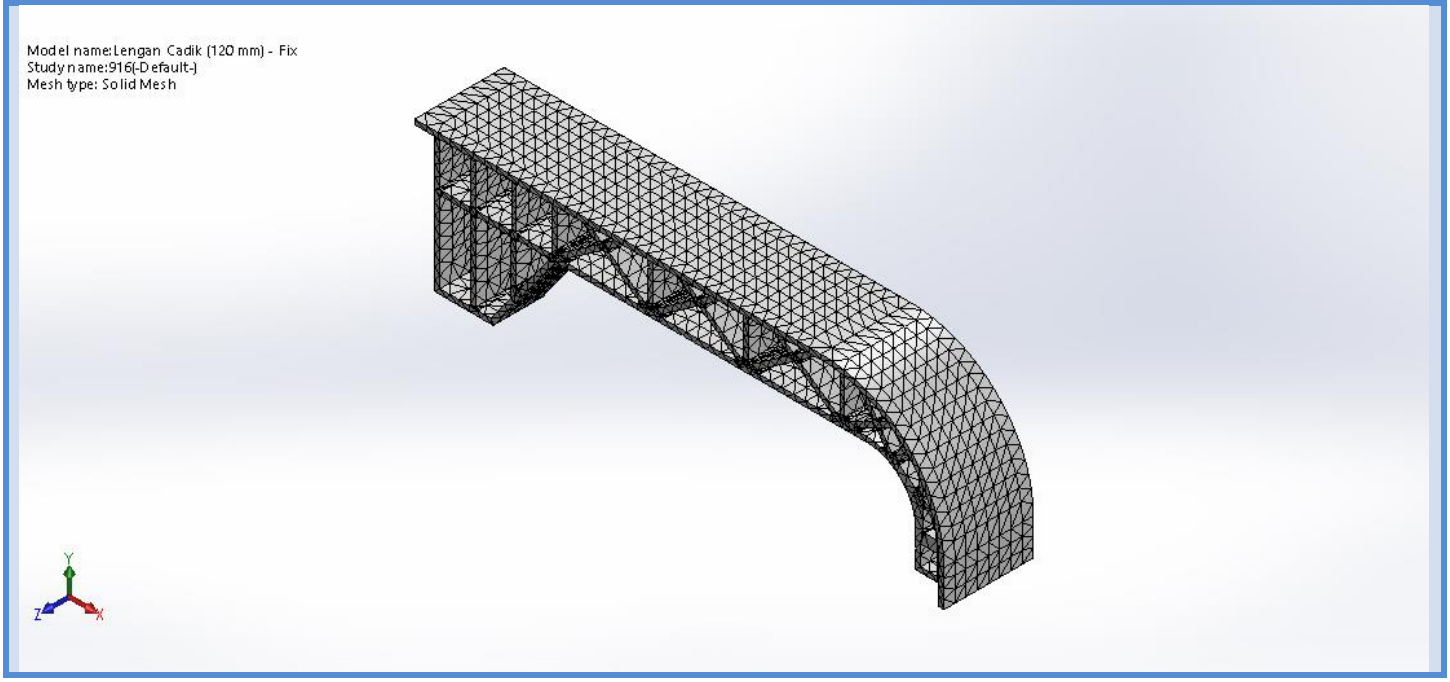
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 916.04 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	29.0559 mm
Tolerance	1.4528 mm
Mesh Quality Plot	High

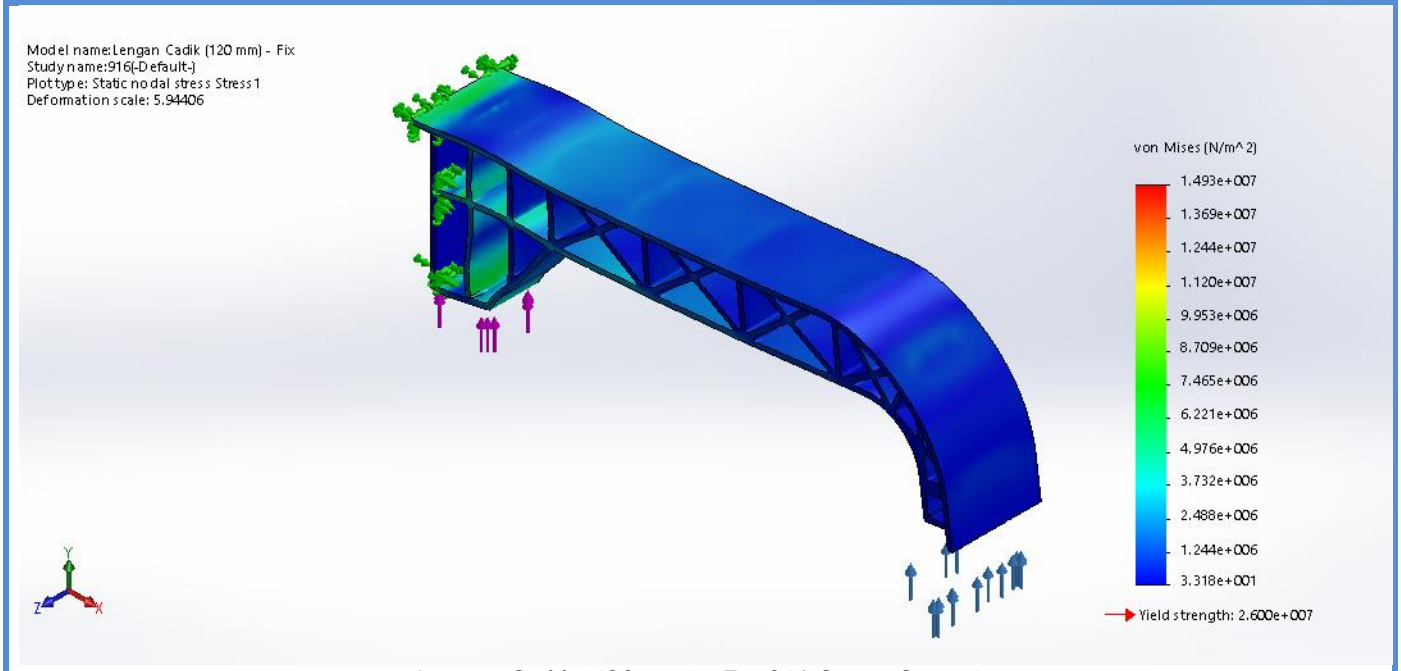
Mesh information - Details

Total Nodes	25767
Total Elements	12836
Maximum Aspect Ratio	21.081
% of elements with Aspect Ratio < 3	61.3
% of elements with Aspect Ratio > 10	0.561
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:05
Computer name:	



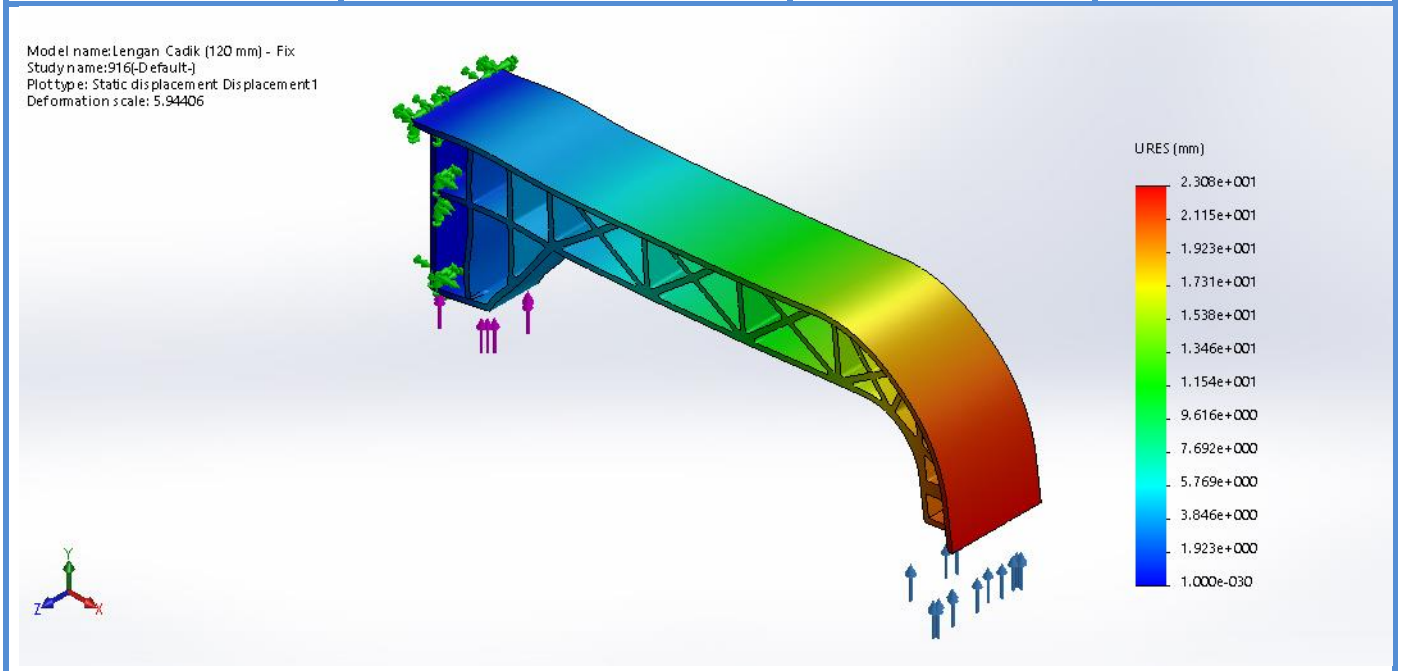
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	3.318e+001N/m^2 Node: 11490	1.493e+007N/m^2 Node: 3875



Lengan Cadik (120 mm) - Fix-916-Stress-Stress1

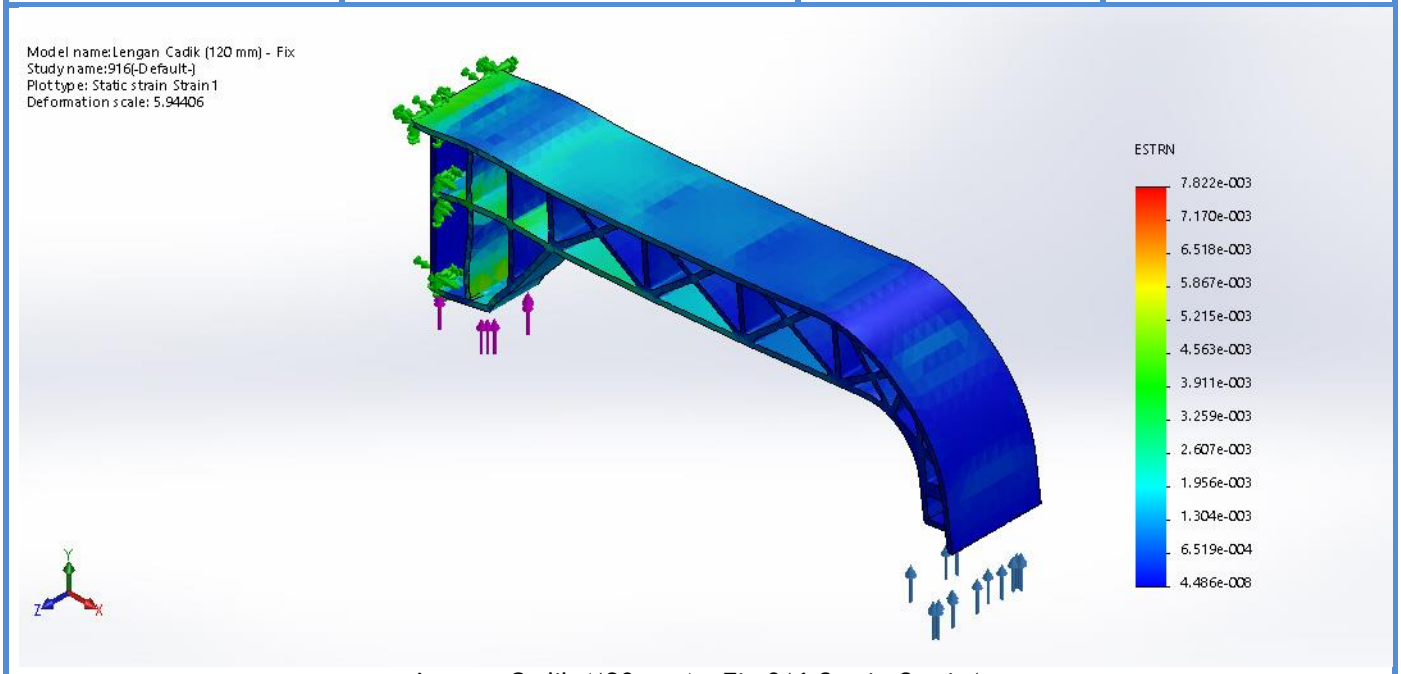
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 512	2.308e+001mm Node: 18115



Lengan Cadik (120 mm) - Fix-916-Displacement-Displacement1

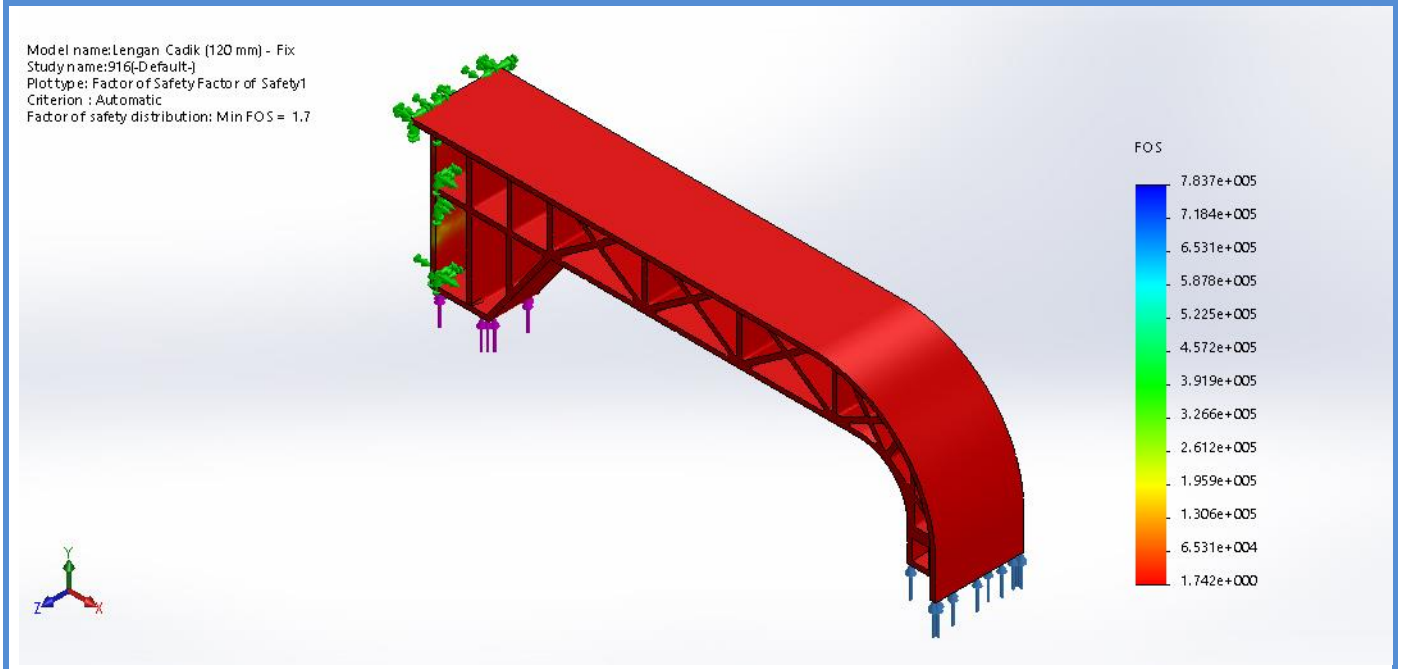
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	4.486e-008 Element: 8326	7.822e-003 Element: 391

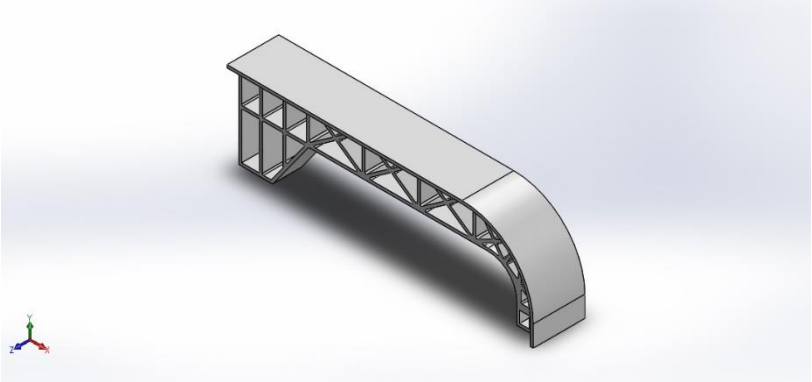


Lengan Cadik (120 mm) - Fix-916-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.742e+000 Node: 3875	7.837e+005 Node: 11490



Lengan Cadik (120 mm) - Fix-916-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (120 mm) - Fix

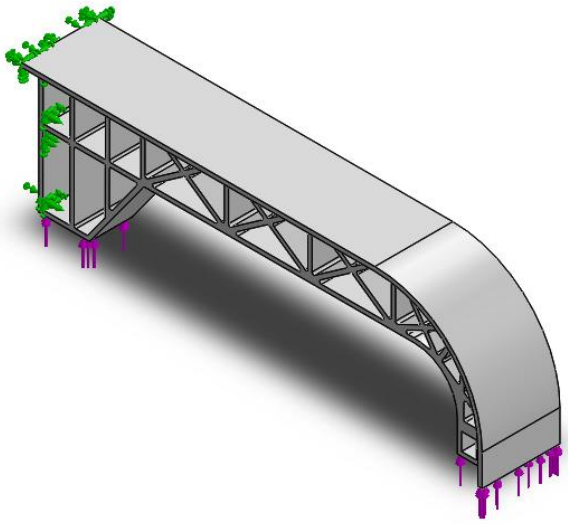
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 1213
Analysis type: Static

Table of Contents

Description

No Data

Model Information



Model name: Lengan Cadik (120 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude2 	Solid Body	**Mass:12.5686 kg** **Volume:0.0132024 m^3** **Density:952 kg/m^3** **Weight:123.173 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (120 mm) - Fix.SLDPRT** Jul 09 09:01:29 2018

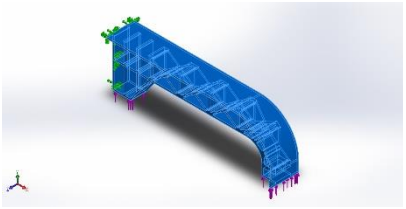
Study Properties

Study name	1213
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

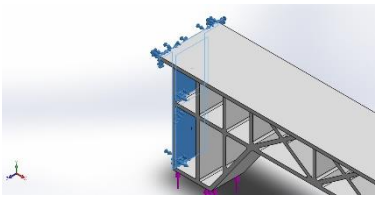
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

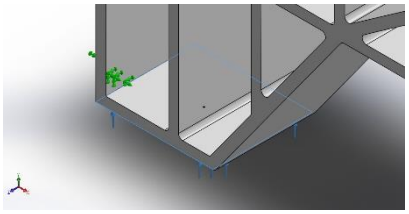
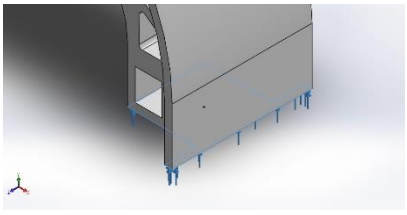
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude2)(Lengan Cadik (120 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-0.273361	-3464.69	0.104858	3464.69
Reaction Moment(N.m)	0	0	0	0

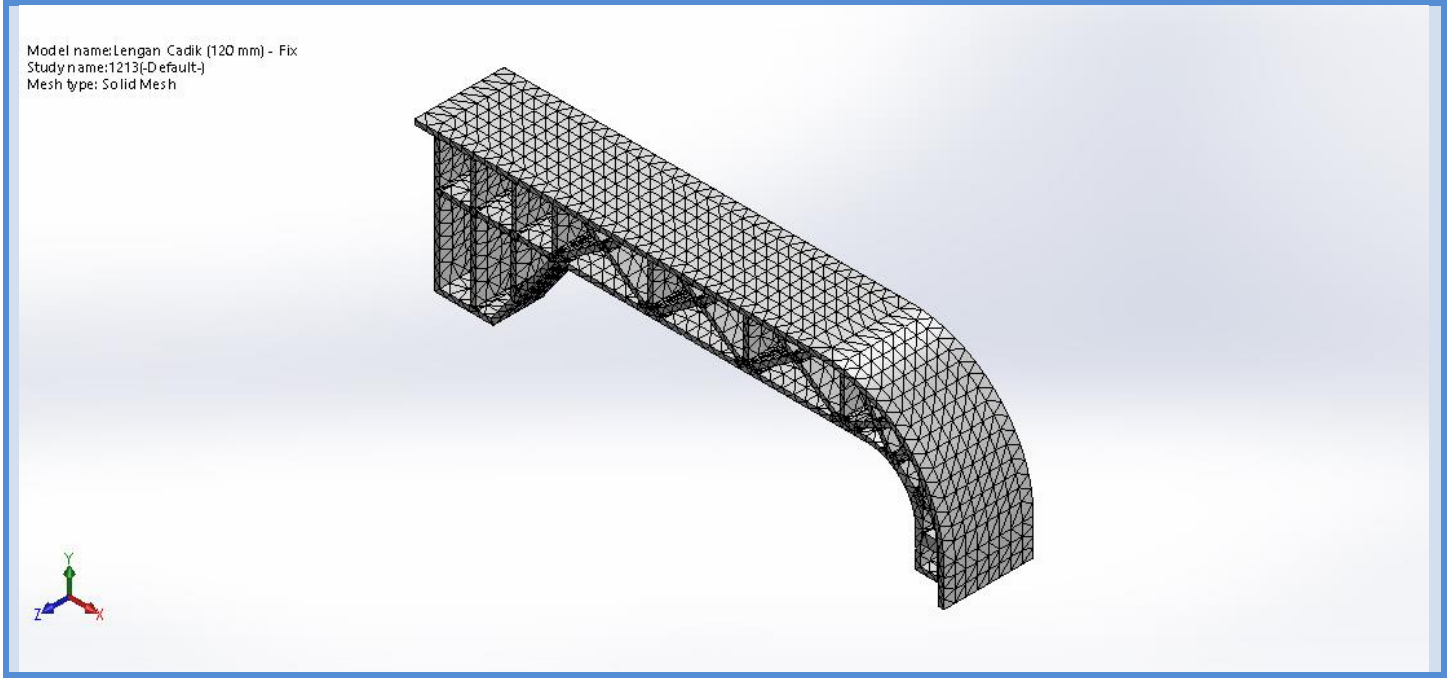
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 1213.18 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	29.0559 mm
Tolerance	1.4528 mm
Mesh Quality Plot	High

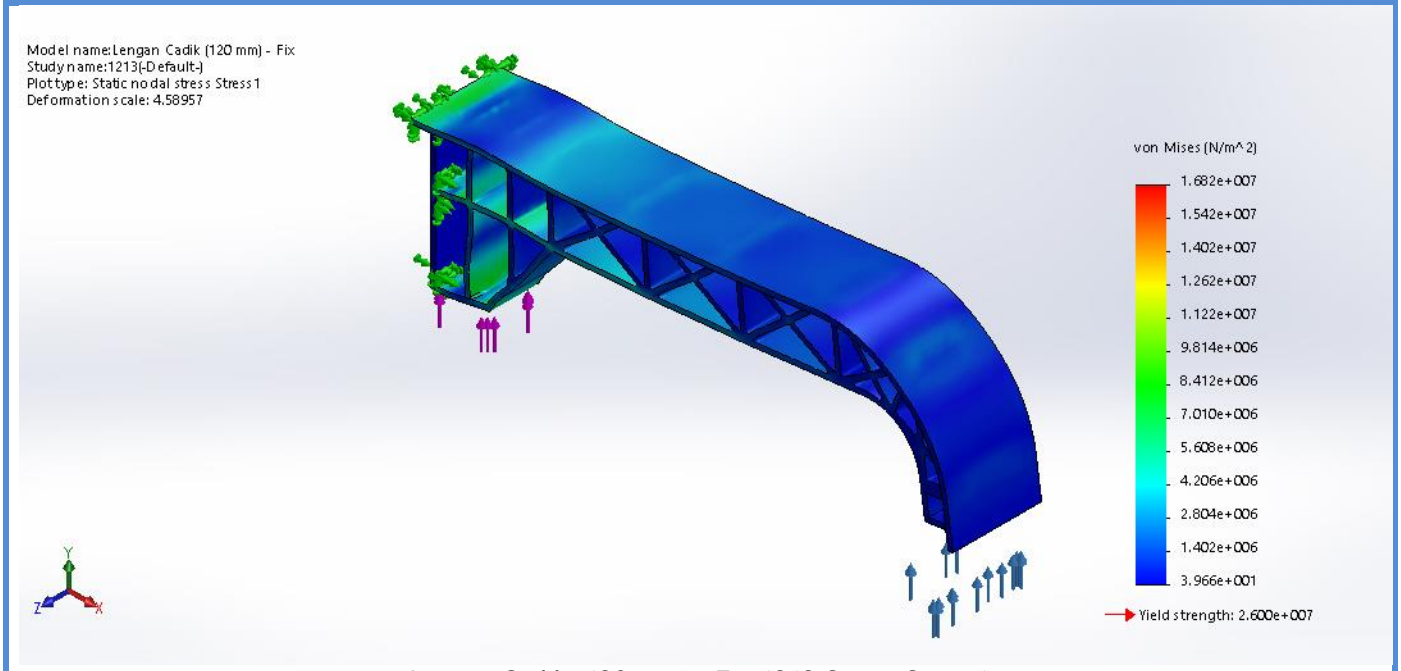
Mesh information - Details

Total Nodes	25767
Total Elements	12836
Maximum Aspect Ratio	21.081
% of elements with Aspect Ratio < 3	61.3
% of elements with Aspect Ratio > 10	0.561
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



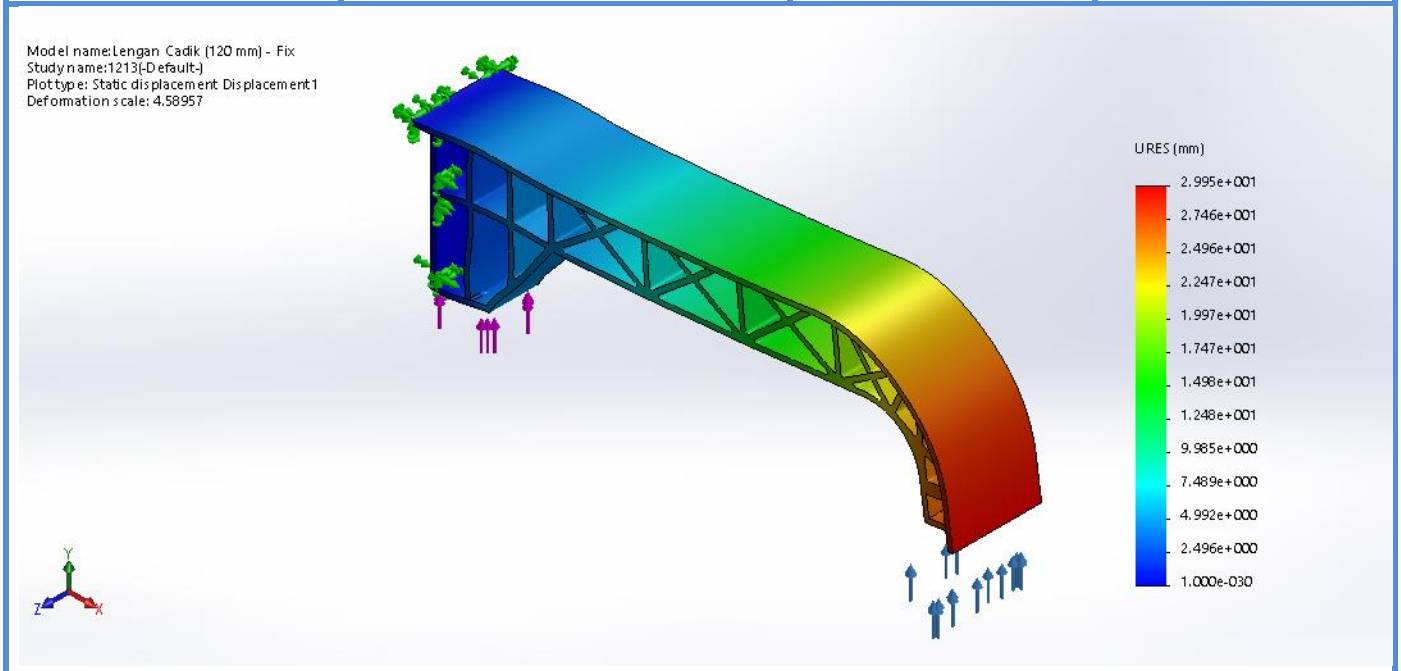
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	3.966e+001N/m^2 Node: 11460	1.682e+007N/m^2 Node: 3875



Lengan Cadik (120 mm) - Fix-1213-Stress-Stress1

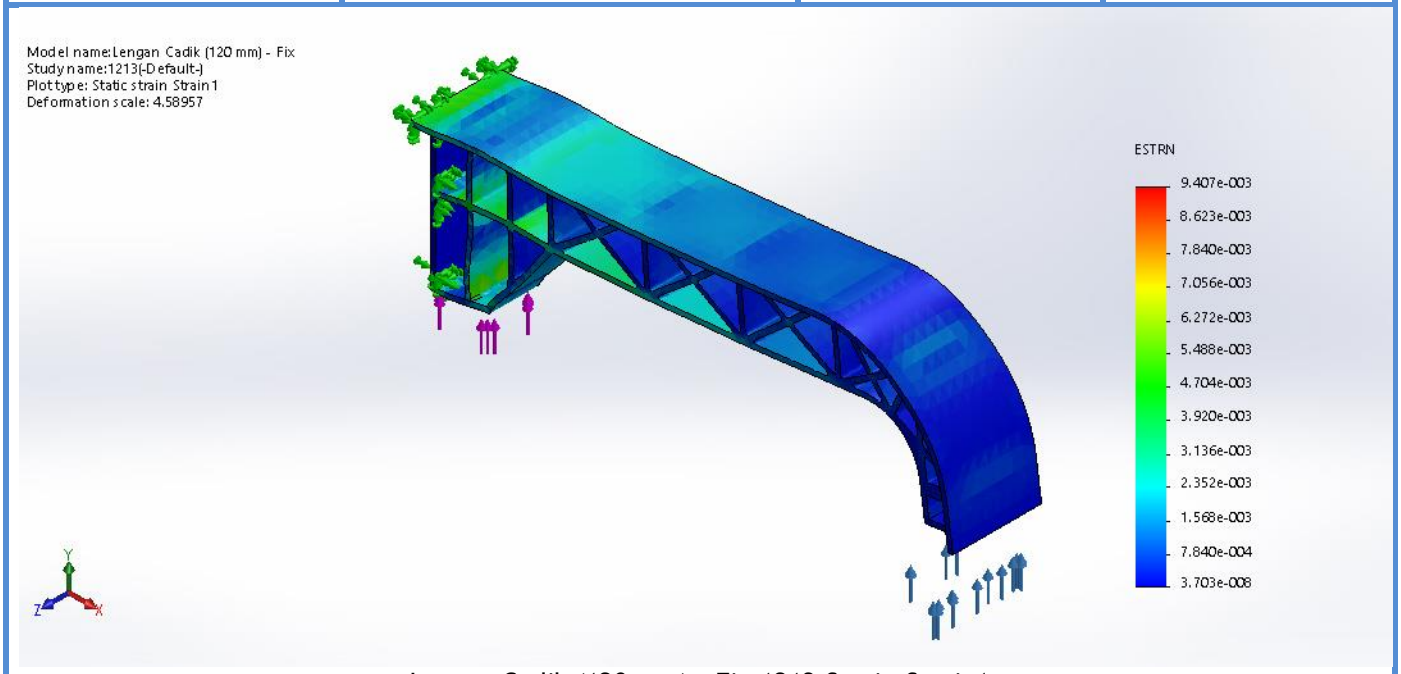
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 512	2.995e+001mm Node: 18115



Lengan Cadik (120 mm) - Fix-1213-Displacement-Displacement1

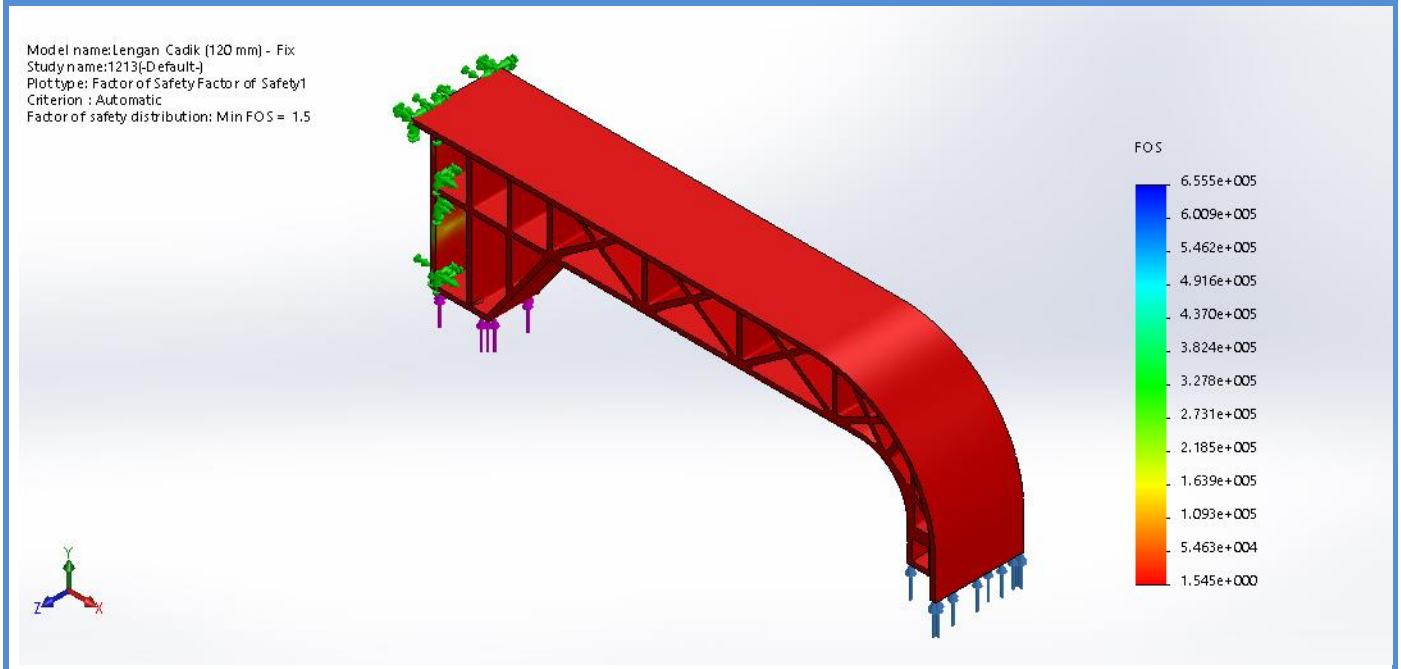
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	3.703e-008 Element: 4874	9.407e-003 Element: 391

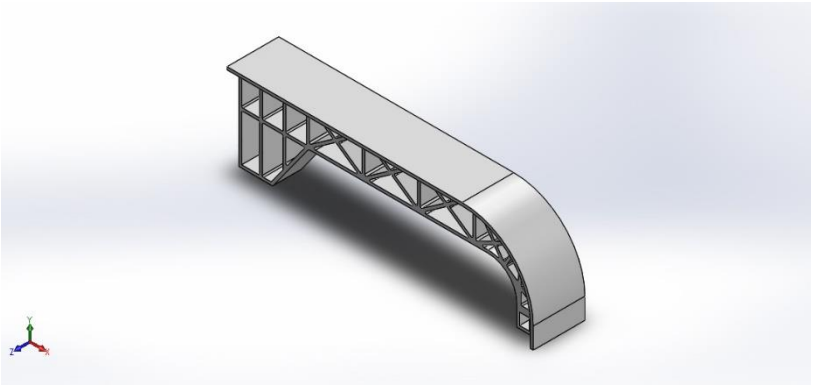


Lengan Cadik (120 mm) - Fix-1213-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.545e+000 Node: 3875	6.555e+005 Node: 11460



Lengan Cadik (120 mm) - Fix-1213-Factor of Safety-Factor of Safety1



Simulation of Lengan Cadik (120 mm) - Fix

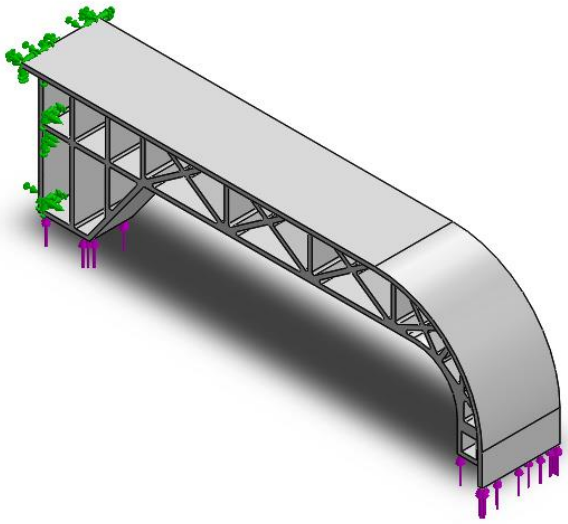
Date: Senin, 09 Juli 2018
Designer: Solidworks
Study name: 1482
Analysis type: Static

Table of Contents

Description

No Data

Model Information



Model name: Lengan Cadik (120 mm) - Fix
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude2 	Solid Body	**Mass:12.5686 kg** **Volume:0.0132024 m^3** **Density:952 kg/m^3** **Weight:123.173 N**	**E:\Kuliah\SolidWorks\Tbar\Lengan Cadik (120 mm) - Fix.SLDPRT** Jul 09 09:01:29 2018

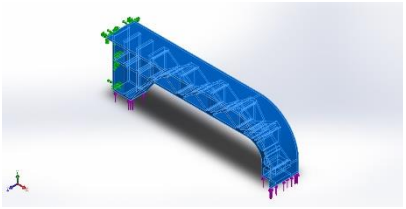
Study Properties

Study name	1482
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (E:\Kuliah\SolidWorks\T bar)

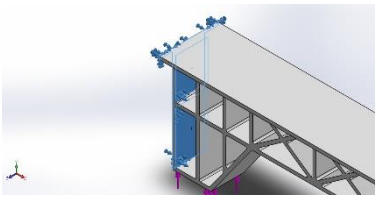
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

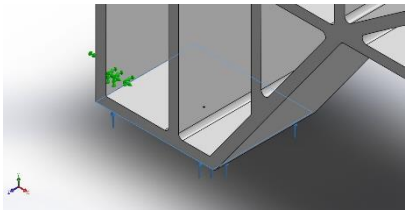
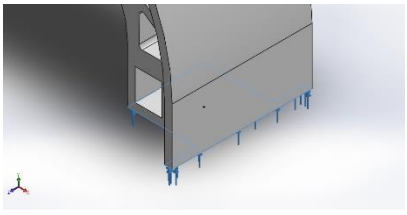
Model Reference	Properties	Components
	**Name:** Custom Plastic **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.6e+007 N/m^2 **Tensile strength:** 2.21e+007 N/m^2 **Elastic modulus:** 1.07e+009 N/m^2 **Poisson's ratio:** 0.4101 **Mass density:** 952 kg/m^3 **Shear modulus:** 3.772e+008 N/m^2	SolidBody 1(Boss-Extrude2)(Lengan Cadik (120 mm) - Fix)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 3 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	0.052063	-3733.89	0.0361786	3733.89
Reaction Moment(N.m)	0	0	0	0

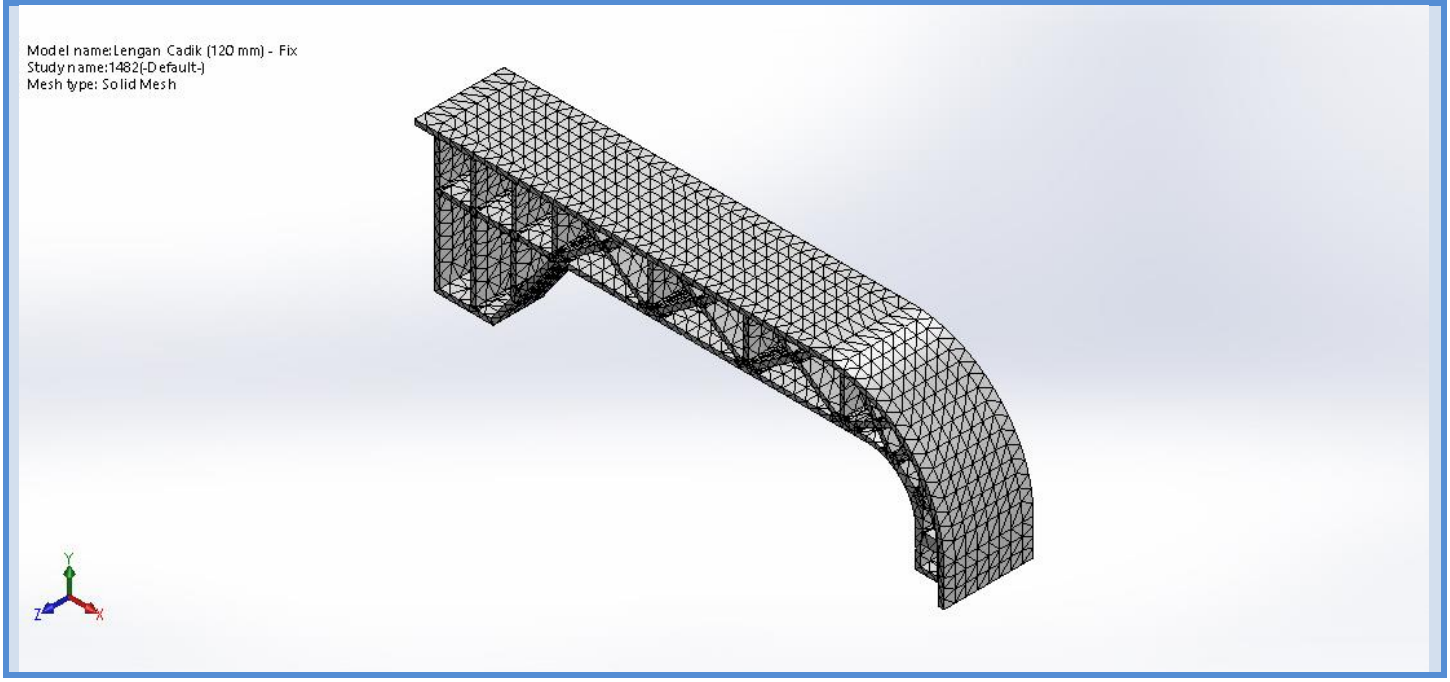
Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 2250.47 N
Force-2		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 1482.27 N

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	29.0559 mm
Tolerance	1.4528 mm
Mesh Quality Plot	High

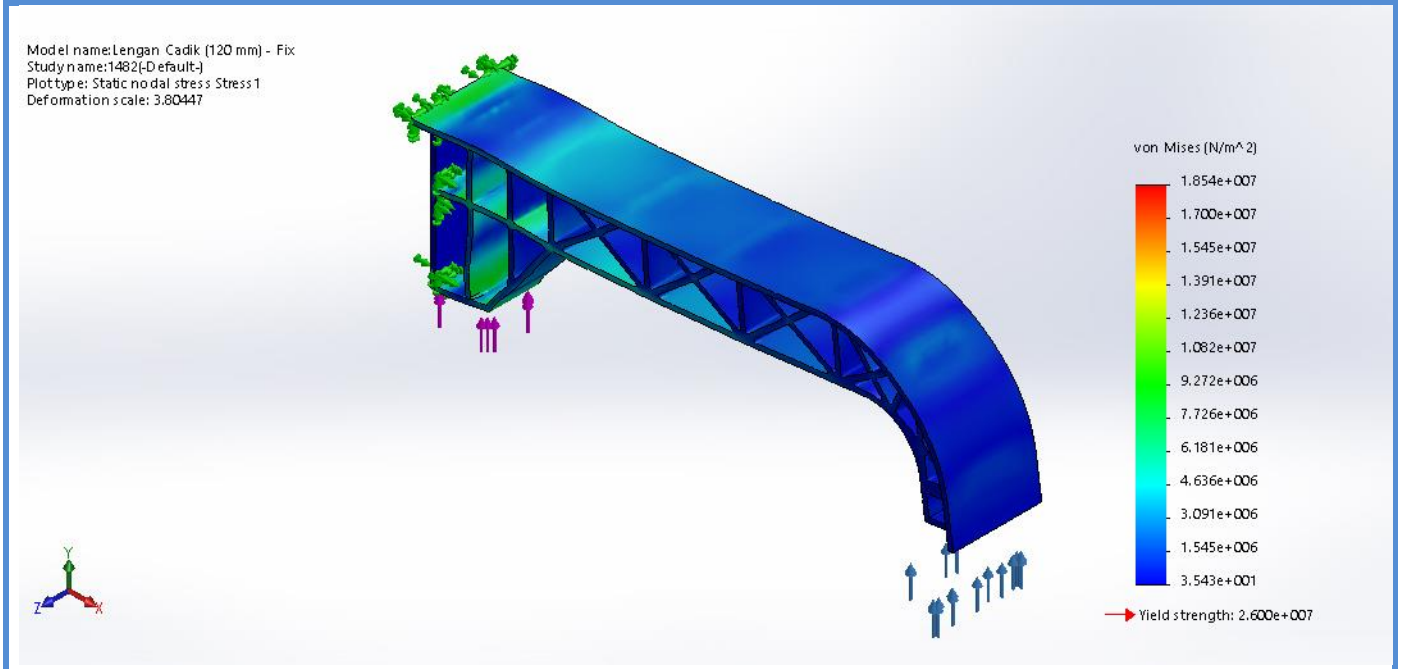
Mesh information - Details

Total Nodes	25767
Total Elements	12836
Maximum Aspect Ratio	21.081
% of elements with Aspect Ratio < 3	61.3
% of elements with Aspect Ratio > 10	0.561
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:04
Computer name:	



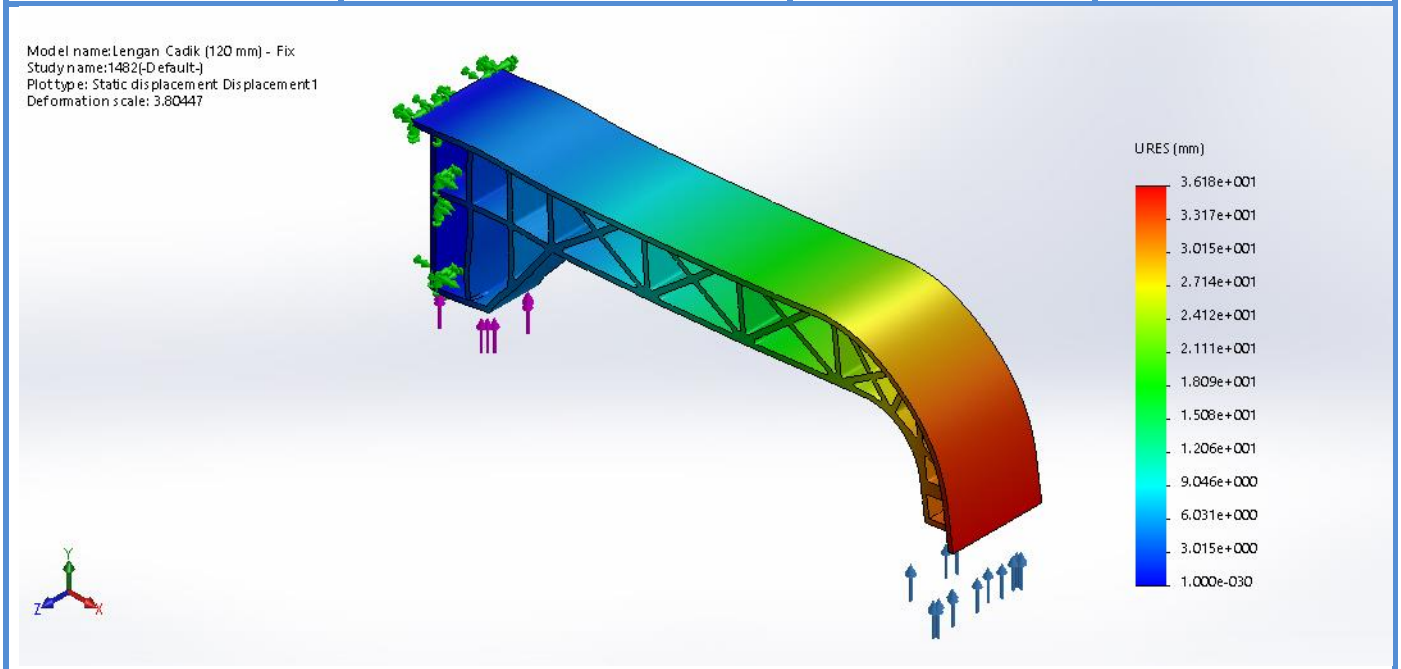
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	3.543e+001N/m^2 Node: 11467	1.854e+007N/m^2 Node: 3875



Lengan Cadik (120 mm) - Fix-1482-Stress-Stress1

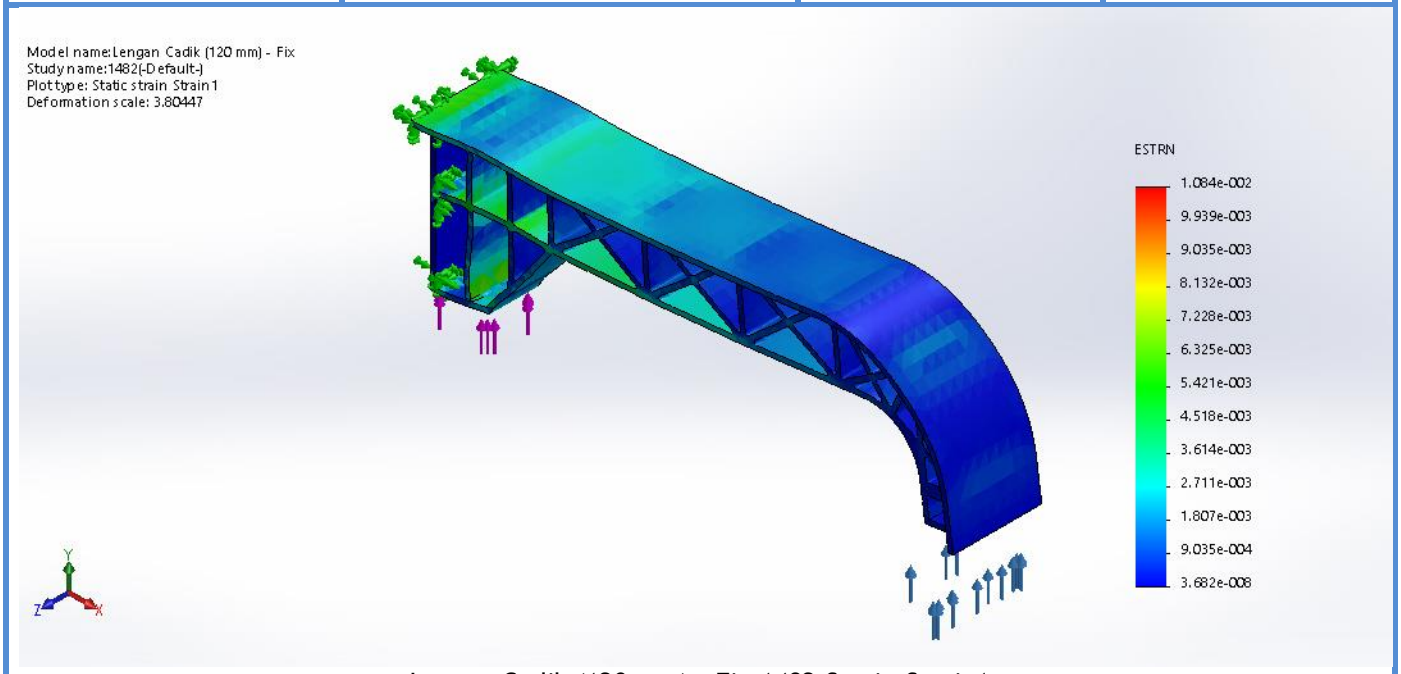
Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+000mm Node: 512	3.618e+001mm Node: 18112



Lengan Cadik (120 mm) - Fix-1482-Displacement-Displacement1

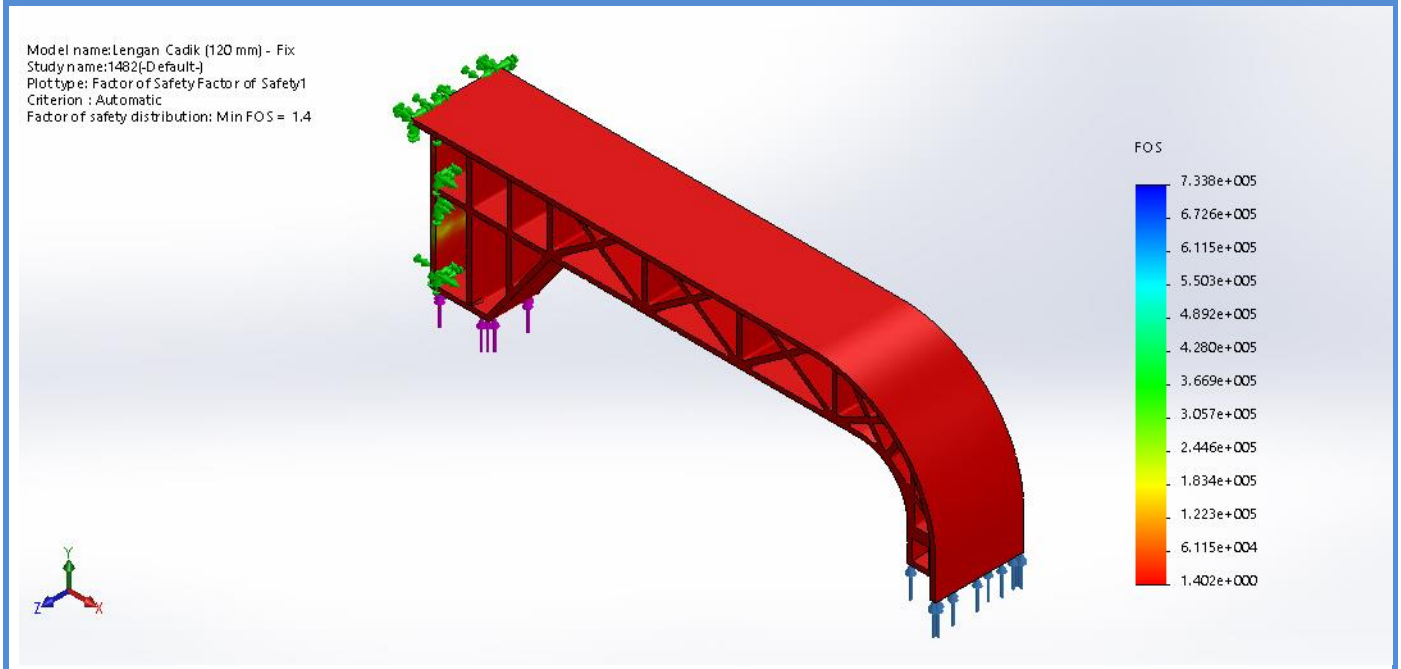
Name	Type	Min	Max

Strain1	ESTRN: Equivalent Strain	3.682e-008 Element: 4874	1.084e-002 Element: 391



Lengan Cadik (120 mm) - Fix-1482-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	1.402e+000 Node: 3875	7.338e+005 Node: 11467



Lengan Cadik (120 mm) - Fix-1482-Factor of Safety-Factor of Safety1